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THE MIND OF THE CENTURY

The Mind of the Century

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INTRODUCTION

[*The following leading article upon this series appeared in the "Daily Chronicle" of December* 31, 1900]

THE articles have necessarily been written on broad and general lines, so as to show only the tendencies of human effort and production within the century, and as far as possible to group together the various leaders of thought whose influence has been most widely felt. It has naturally been impossible to cover the whole field, and, for one thing, as Englishmen we have devoted most attention to the progress of mind in our own islands. Many names also, which some would have liked to see mentioned, and which probably deserved mention, have inevitably been omitted; and we are still too close to the last quarter-century, we are still too much entangled in the confusion of its interests, to distinguish with accuracy the true importance of its several currents. This is especially true of artistic work of all kinds, whether of literature or music or "the arts." On such things we know from old experience that it is very rare for contemporaries to give a just decision. But still we think that we have in this series taken up and traced all the chief lines of human endeavour since the century began; and if it is supposed that we have dwelt too exclusively on the progress of thought in England, we have at least the satisfaction

of knowing that in all departments of thought, with but one or two exceptions, Englishmen have been among the foremost leaders, even where they have not actually led the world.

On the whole we cannot doubt that, whether at home or abroad, the century has been intellectually one of the greatest in history. Poets have shown a new imaginativeness and daring, combined with strange melody and beauty of form; they have been possessed by a deeper seriousness, a nearness to nature, and a sincerity which rejects all that is artificial and secondhand. Dramatists have no doubt fallen short of the supreme standard reached by Athens and Elizabethan London, but the growth of the theatre as a whole since the century's beginning has been marked by the same freshness and sincerity as the poetry. The novel is one of the century's most characteristic productions, and in all its various forms it has reached a higher level than ever before. The essay is not new, but its influence was never greater, and it has been used by many masters of noble style and thought. Artistic criticism has shown a breadth and delicacy of perception for which even the Greeks were only preparing the way, while philology as a critical science has been created anew. It is perhaps in music that the chief artistic triumph of the century lies; for the art of sounds has entered upon an undiscovered world of expression, and has touched depths of emotion before unreached and perhaps unsuspected. In the plastic arts, to be sure, including architecture and the decorative work of common life, we are utterly defeated, not only by Athens, but by Egypt and the ancient East, as well as by all the chief nations of mediæval Europe and by some later periods in our own country. But still within the century's limits we have seen painting express a more poetic and deeper insight into nature,

and artists have represented ancient themes and permanent human emotions under new conceptions of colour and design. The highest examples of art have been thrown open for every one to see, and the end of the century is marked by a revived beauty in architecture as well as in some kinds of handicraft and household stuff of expensive simplicity. Under the influence of philosophy and biology, history has so much changed since the beginning of the century as to be hardly the same science ; or rather what was then considered history is now only a small plot in an immensely extended field of investigation.

Travellers have left hardly any district of the world unexplored. The poles have almost come within sight ; the Nile has yielded its secret, and the centres of great continents are added to the knowledge and sometimes to the habitation of civilised men. Both in theology and philosophy the problems of thought are now of deeper import and wider scope; the essentials are clearer and no less absorbing, while much tradition and ignorance have fallen away, so that perplexities which afflicted our forefathers have found a solution or ceased to trouble. Economics may almost be called a new science, as history is new, and of late it has shown a humane and considerate tendency which brings it into close connection with ethics. Education, as far as most Englishmen are concerned, may almost be said to belong to this century alone ; while, throughout the world, the method of developing a child's mind instead of filling it has changed the system of teaching. The whole conception of chemistry and medicine has been revolutionised by such discoveries as the atomic theory, the conservation of energy, bacteriology in its widest developments, anæsthetics, and theories of sanitation. But it is in natural science that the century has made its greatest progress. Hereafter it will be known as the century of

Evolution, and the aspect of nature rather vaguely expressed by that word has touched and influenced every other department of thought, except perhaps the pure mathematics which lie beyond change. The spectroscope, embryology, the theory of protoplasm, have opened up new conceptions of the vastness of the universe as well as of the minuteness of life and the slow antiquity of its development. Finally, by the application of science man has created the railway, the steamship, and the telegraph in many forms. He has bridged seas and tunnelled through the barriers of mountains. He has forged bolts to burst at a range of several miles, and has brought the lightning to shine in the rooms of his house. "Many things are strange," said the Greek poet, "but none so strange as man." During this century he has been at his strangest, and has displayed his most characteristic energy.

We think the retrospect of a hundred years may well fill us with hope. An incalculable amount remains to be done, and the problems of life are continually shifting. Much that is horrible is left, much hideousness of spirit and of life's surroundings; much brutality, oppression and injustice; much insensate vulgarity and indifference to the thoughts or misery of others; much greed for possession, many false distinctions of class, not only through the difference of rich and poor, but through the much more serious difference of educated and ignorant. But still, on the whole, we have received from the century a heritage of hope, which we may confidently pass on to the coming age, believing that as we stand in front of the race of a century ago, they too of a century hence will stand in front of us. "We bid you hope," said Goethe, and there is no finer message to be drawn from history. But if among the multifarious lines of this century's thought we were to search for one common quality that has

inspired and characterised them all, we should perhaps find it in courage. Not only have individual artists and thinkers dared to follow their star through good and evil, but in this age man has shaken off a very large amount, not of reverence, but of fear. Our watchword has been Carlyle's "Fear nothing but fear." Man has had the courage to pursue reason wherever she might lead. He has dared to see things for himself and with his own eyes. He has refused to rest satisfied with any secondhand rule, opinion, or authority, and by his courageous resolve to launch out into unknown waters he has discovered regions of thought, of beauty, and activity, which are different from what he left behind, but in the end are seen to be no less fair and full of interests more profound.

I

POETRY

BY LIONEL JOHNSON

THE poets of the nineteenth century did well. That, I am convinced, will be the verdict of the centuries to come; also that, while scarcely one of the nations did not shine in respect of poetry, France and England excelled the rest. An age filled with tendencies and interests not commonly accounted poetical, an age of industrialism and exact science, has produced a body of poetry marked by nothing more notably than by its imaginativeness, its æsthetic daring, its limitless dreaming, its technical variety and skill. The nineteenth century has in poetry risen above the mainly placid levels of the eighteenth; the famous "returns" to nature and romanticism and idealism, which the close of that century saw begun in England, France, and Germany, have remained in undiminished force as the chief springs and motives of poetry. And, though it is possible to group the poets of the passing century in schools and lines of succession, it has been an age of intense individuality in art, rich in personalities, and a very various distinction. But two features have been prominent, both separately and in conjunction. The poets of the century have been, in the Aristotelian sense, philosophic poets; and they have been cunning

craftsmen. It could not with truth be said of the poets of the last century that we turn to them for the deepest expression of its thought ; it would be very largely true to say it of our own. It could not be claimed that the poetic craftsmanship of the last century, careful and perfect in its kind as it could be, was rich and various ; our own has borne many an "inventor of harmonies," from whose standard it should be impossible for poetry to recede. A third, but less important feature of the age in poetry is its multifariousness of range ; its dramatic reach, its romantic scope ; the names of Hugo and Leconte de Lisle, of Browning and Morris, conjure up a world of imaginative pageantry, vast realms new-found for poetry. It might be urged, without excess of paradox, that for purposes of literary, as also of political, survey, the nineteenth century began with the last quarter of the eighteenth. The fame of many nineteenth-century poets was firmly established, or deserved to be, in the eighteenth. Germany of the nineteenth century has produced no poet greater than Goethe, England none greater than Wordsworth. Since their appearance, it may be said of poetry, *plus ça change plus c'est la même chose.* The deepening of imaginative thought, the emancipation of poetry from outworn conventions the care for beauty, the lyrical impulse, the wider scope which distinguish the best poetry of the century, came to the birth before the dawn of 1801 ; the dawn of 1901 bids us look back over many combinations and variations of them, but it opens upon no new birth of poetry, no change in its essentials.

Poetry has been a power during these last hundred years ; it has both expressed and excited their vague unrest, their despairs and hopes, their lookings backward and their lookings forward. Fletcher of Saltoun, in his famous saying, probably confined himself to poetry of the simplest orders, immediately moving ;

but the highest poetry of the century, the most intellectual and ideal, has furnished many minds with a kind of religion, and served them as Wordsworth served Mill. It is certainly untrue to say that the poets of the century have in the main written with a "purpose," a propagandist impulse or intention; but it were equally untrue to say that they have been "idle singers of an empty day." The poetry of the age most remote in seeming from the age's character and aspect, poetry often of an almost antiquarian kind, given over to some resuscitation of paganism, or to some graceful dalliance with the ways and thoughts of a past generation and age, testifies in an especial manner to the spirit of the century, so ardent, so troubled, so in need of solace. And there have been poets such, in England, as Mrs. Browning and Clough, and Kingsley and Dobell, whose work has a tense vibration and strain, an almost too faithful echo of the age's aching thoughts and wonders. Though there has been a welcome plenty of poets light and fanciful and playful, the nineteenth century has not been one in which poetry has been an elegant accomplishment, a pretty trifle, a polite amusement. The aërial Shelley would convert the world by his melody, by spiritual reason garbed in beauty. Baudelaire, æsthete of æsthetes, sings sermons; most poetry of the expiring age rings true to some deep convictions in the hearts and minds of its makers. But so diverse, so variegated have been those spiritual and æsthetic attitudes towards life and art, that it is not possible to trace a methodical development in the history of the age's poets. Common to all of them is a passion for poetry, an immense reverence for it, a profound feeling for its dignity, its capacity, its high rank among the possible expressions of humanity. It may well be that we, children of the nineteenth century, deceive ourselves, and worship what future ages will discard and ignore; and yet, at heart, we

feel secure in our judgment that the nineteenth century is, in kind if not in degree, a great poetic age, even as the Periclean and Elizabethan.

If we start from Wordsworth and Hugo, we find them but the first of a goodly poetic line in England and France. Coleridge, Landor, Byron, Shelley, Keats, Tennyson, Browning, Mrs. Browning, Arnold, Rossetti, Morris, Patmore: it is no meagre list of poets gone "where Homer and where Orpheus are," and where a host of admirable lesser contemporaries keep them company. France, from Hugo to Verlaine, boasts a line at least equal to the English, and, in Hugo, the chief writer of the century. Almost all its greater poetry has the note of the ideal, of imaginative and speculative passion; even the poets of whom Gautier is the type, whose aim is to create nothing but a lyric loveliness, have expressed through poetry a pronounced view of life, and, in the sensitiveness of their artistic consciences, have attained to something of a "high seriousness." The century has seen many forms of reaction from the ways of its predecessor, the *sæculum rationalisticum*, and its poetry has been among the foremost. It has taught us to look upon nature with new eyes, found fresh means of escape from materialism, bidden us comprehend the soul of past ages, quickened our insight and research into the soul of man, made both optimism and pessimism more profound, liberated verse from its chains, sung to a larger music in a richer tongue, insisted upon the mystery of things, restored the spirit of romance, extended its provinces upon every side, and become a spiritual power. The voice of Wordsworth, when "in the spirit," is as authoritative as the voice of Darwin, and since his day, to quote Coleridge, poets have learned to "spread the tone, the atmosphere, and with it the depth and height of the ideal world, around forms, incidents, and situations, of which, for the common

view, custom had bedimmed all the lustre, had dried up the sparkle and the dewdrops." Even such things as the sombre negations of Leopardi or the bright impieties of Heine have upon them this recovered freshness and sincerity. And in depth of passion, the poets have excelled: Byron, the least perfect of great poets, taught romantic loves and hate to all Europe and influenced poetry from Moscow to Madrid. Even more than music and painting, poetry has been the fine flower of the age's art; and, though the world may contain to-day but few poets, or none, of the first rank, there is no sign that poetry is entering upon a period of bankruptcy or decay. Signs of change there are, and the twentieth century may well see "things unattempted yet" in the province of poetry: but such signs are slight.

In nothing has the poetry of the last hundred years shown itself more profusely, even prodigally, fertile than in its interpretation of nature. The great elemental human passions vary little from age to age in their essentials, however widely in their internal circumstances and expressions; it is otherwise with the relations, not of man to man, but of man to nature. Pantheism, dangerous enough as an intellectual faith, has seemed the necessary attitude of the century's poets toward the visible world in all its manifestations: enraptured converse with the *anima mundi*. Our poets have left no silences, no inarticulateness, in nature. "Arbres de la forêt, vous connaissez mon âme!" cries Hugo, and almost all his fellow poets have known like intercourse and friendship, with a various intimacy of feeling felt by scarcely a poet of antiquity, save Virgil and Lucretius. Upon the technical side, the century's poets have been vastly inventive, introducing countless novelties in construction and rhythm; not always without detriment to established laws of their art. The almost universal revulsion from the classic or the

academic has produced, in America, for example, that magnificent anomaly, Walt Whitman, and in France a defiance of poetic conventions, beside which the innovations of Romanticists and Parnassians seem timid. Contrasted with the poetry of the last century, for the most part so orderly and unenterprising, the poetry of this is bewildering in its diversities of matter and form: an "Augustan" age of "correctness" scarcely seems to be at hand, but it may have to come. It would be hard to say what kind of poetry has been most successful during these hundred years of its assiduous cultivation; probably the lyric, if a wide scope of application be extended to the word. It has been an emotional age, full of ferment and agitation, and the "subtle-souled psychologists" of poetry have proved themselves in touch with it. The lyric, the idyll, the swift dramatic study, have been more in favour than works of prolonged elaboration. Such works have certainly not been wanting, but they seem less characteristic of the century, which in this matter has tended more and more towards the conviction of Poe, and inclined to value most highly the verse which is a brief flight of music.

It is noticeable that the lands of the ancient civilisation have still no rivals in the production of great poetry: the British Colonies and the United States can point to no poet of the first order, and to less than a score of eminent merit. In Europe, Scandinavian poetry has won its way to the world's ear, and Ireland has, almost for the first time, added an admirable contribution to the sum of English verse. I do not profess to explain why, of the two countries, Italy and Germany, which have experienced most change in the body politic and the conditions of life at large, Italy has been poetically fertile, while Germany has not. The unification of the German States produced no second *Aufklärung*. But the

spirit of art always "moves in a mysterious way, its wonders to perform," and, though essentially rational, is seldom wholly explicable. And for that reason prophecy about the future of poetry is idle, and even criticism about the past must be but an approximation to the truth. As to the present, it is with just pride that England can claim to see the century pass into the past, if with less poetic glory than adorned its birth, yet, in that regard, not unworthily. Italy, with her veteran Carducci, excepted, no other nation, to my imperfect knowledge, can name equals to Mr. Swinburne, Mr. Meredith, Mr. de Vere: none possesses poets of younger generations more promising than ours; in none is the average level of aim and accomplishment higher. One prophecy at least is not rash: poetry may often be in abeyance, but it will never die. Once it was thought that physical science, the pressure of material cares, discovery in its many forms, would prove fatal to poetry; it has not been so. Such influences as these have made poetry here, have failed to affect it there, have killed it nowhere. "It is dangerous to differ in religion from the saints, in poetry from the poets": even the Gradgrinds of the world, the hard utilitarians, recognise uneasily a sacrosanctitude in poetry, its source in "an ampler ether, a diviner air." The nineteenth century has done homage to poetry. In the case of all its greatest poets, it has been obedient to Dante's words, "Onorate l'altissimo poeta!" Consoling, heartening, uplifting, delighting, inspiring, poetry puts forth its powers in a profusion of ways, with a catholic extent of range: though it sing of the most "old forgotten, far-off things," its beauty has a direct relevance to its day, and provides an escape into the infinite. The poets of the nineteenth century, who have explored all ages, and sung of all things from the Pyramids to the steam engine, are among its most potent forces. And we may be thankful that the Muse of the dying

century has chiefly been the Uranian, a cause of spiritual joy, a teller of the whitest dreams. A troublous age, crowded with eventfulness, has bequeathed to the unborn ages nothing more imperishable and precious than its golden harvest of poetry: in that matter, at least, it may die with a mind at peace.

II

DRAMA

BY WILLIAM ARCHER

THE nineteenth century has been an age of revolution in the English theatre. During the eighteenth century the organisation, the methods, and the ideals of the theatre had altered comparatively little. The actors and dramatists of 1800 aimed at very much the same effects at which their predecessors had aimed in 1700. Acting had on the whole progressed during the century, dramatic authorship had on the whole declined ; but neither art had broken with its traditions, or made any definite new departure. The close of the nineteenth century, on the other hand, finds the organisation of the theatre which obtained at its opening (the monopoly system) abolished and well-nigh forgotten ; the repertory of 1800 (except Shakespeare and three plays by Sheridan and Goldsmith) absolutely dead ; and both actors and dramatists aiming at effects undreamt of by their predecessors of a century ago. The theatre of 1800 appeared to be flourishing, but contained within it the seeds of decay; the theatre of 1900 appears to be chaotic, but may prove to contain within it the germs of a new order.

No theatre can be in a really healthy state in which acting entirely out-distances authorship. At the beginning of the nineteenth century the actors

were everything, the authors nothing. People talk of the evanescence of acting ; but every one is familiar with the names of at least a dozen great actors of the first twenty years of the century, while no one, probably, except a professed student of the stage, could mention off-hand a single playwright of the same period. The year 1801 found Mrs. Siddons, Mrs. Jordan, John and Charles Kemble, G. F. Cooke, Elliston, Munden, Dowton, and Emery in possession of the stage, to be joined soon afterwards by the elder Mathews (1803), Liston (1805), and Charles Mayne Young (1807). Mrs. Siddons retired in 1812, and John Kemble five years later ; but 1814 brought Edmund Kean and Miss O'Neill to the front, 1816 Macready. Who, now, were the dramatists of the period? They were "Reynolds, Dibdin, and Cherry" (the trio at whom the youthful Leigh Hunt was never tired of jibing), Morton, Holcroft, Tobin, Colman the younger, "Monk" Lewis, Sotheby, Maturin. Tragedy was decrepit. Eighteenth century comedy was blindly and blunderingly transforming itself into domestic drama, no one having the originality to recognise the change and frankly adapt himself to it. The dominant force in theatrical literature was that lurid German romanticism which Jane Austen satirised in "Northanger Abbey." M. G. Lewis was the Mrs. Radcliffe of the stage, and our great grandmothers were thrilled to the marrow by "The Castle Spectre," "Adelmorn, the Outlaw," and "Rugantino, the Bravo of Venice." It is a significant fact that not a single character "created" by John Philip Kemble, Mrs. Siddons, or Edmund Kean is now remembered either in literature or on the stage.

The appearance of Macready in 1816 was coincident with a slight revival in dramatic authorship. Tragedies, or rather rhetorical melodramas, of a certain turgid literary quality, began to be produced in some numbers. Lalor Shiel's "Adelaide," "The Apostate,"

and "Evadne," and Milman's "Fazio" preceded the production in 1820 of Sheridan Knowles's "Virginius," which even such a critic as Lamb hailed as almost Shakespearean in its "clean passes of pathos." For twenty years Knowles was recognised as the leading dramatist of the time, his intolerable pathos and still more distressing humour finding an acceptance which we can only regard as marvellous. His popularity culminated in 1832, when Fanny Kemble attracted all London in "The Hunchback." Barry Cornwall, Miss Mitford, and Joanna Baillie were also among the acted playwrights of this period, while towards its close Talfourd's "Ion" made some success. All these plays are unactable and practically unreadable to-day; nor would the plays of Byron, which at this time found their way to the stage, survive on their intrinsic merits. There was more real vitality in the melodramas founded upon the "Waverley Novels," which were for many years exceedingly popular.

Meanwhile the system which gave the two "patent houses," Drury Lane and Covent Garden (with the Haymarket in the summer season), a monopoly of the "legitimate drama," was every year becoming more manifestly obsolete and oppressive. The population of London was rapidly increasing, and the managers were more and more subject to the temptation of bidding for long runs with spectacular plays of an ephemeral order. At the same time, the inventiveness and mechanical ingenuity of French playwrights of the school of Scribe was rendering their productions exceedingly attractive throughout Europe, and not least in England. Thus the "legitimate" was being more and more elbowed aside at the Patent Theatres, which at the same time retained a dog-in-the-manger hold upon it. Macready, for example, was compelled to engage with one or other of the showmen-managers of Drury Lane and Covent Garden because he could not legally exercise

his art elsewhere; yet, having signed articles with the "Poet Bunn" at Drury Lane, he found his repertory practically shelved in favour of adaptations of Scribe's "Bertrand et Raton," and "La Juive." The idea of treating Shakespeare spectacularly and "mounting him for a run," had not yet been conceived. At the same time other theatres were growing up, and the absurdity of condemning them by law to play melodramas and "burlettas" only was daily becoming more apparent. A certain number of outside theatres, several of them originating as circuses, had come into existence during the latter half of the eighteenth century—Astley's, the Surrey, and Sadler's Wells being the most notable. But with the new century these irregular playhouses began to invade the West-end. The Adelphi and the Olympic date from 1806, the Lyceum from 1809, the Tottenham Street Theatre from 1810, the Coburg (later the Victoria) from 1818, the Strand from 1832, and the St. James's from 1835. Thus by the time of the Queen's accession a strong agitation for theatrical free trade had arisen in many quarters.

One great effort, however, was still to be made under the old system. Macready, now the acknowledged head of his profession, undertook the management of Covent Garden from 1837 to 1839, and of Drury Lane from 1841 to 1843, with Helen Faucit, in each case, as his leading lady. He gave Shakespearean revivals of great scenic nobility, and he produced, among other successful novelties, Bulwer's "Lady of Lyons" and "Richelieu"; but several of his productions were failures (Browning's "Blot in the 'Scutcheon," for example), and as he resolutely refused to adopt the policy of long runs, he could not make either experiment pay. This was the last struggle of a dying system—the system which had been in operation ever since the days of Betterton. Even the repertory on which Macready depended was

more like that of Betterton's time than that of to-day. It included such plays as "Venice Preserved," "Jane Shore," "Cato," and "Love for Love." In the interval between his two essays in management, Macready created, at the Haymarket, the leading parts in Bulwer's "Sea-Captain" and "Money." Between 1843, when his second managerial venture came to an end, and 1851, when he finally left the stage, his only new part of any importance was Philip van Artevelde in Sir Henry Taylor's too little known dramatic romance of that name.

A Parliamentary Committee of 1832 reported strongly against the monopoly system, but it was not abolished until 1843. One of the first results of Free Trade was the establishment of what might without over-assumption have been called a Shakespeare Theatre at Sadler's Wells, where Samuel Phelps, from 1844 to 1862, carried on a gallant and not unsuccessful effort to keep the classic drama alive on the stage. Phelps aimed at modest appropriateness of mounting, while Charles Kean, who managed the Princess's from 1850 to 1859, buried Shakespeare in costumes and pageantry, and tried to recoup himself by means of long runs. The movement towards accuracy in historical costume and sedulous modishness in modern dress went on by fits and starts between 1835 and 1865. It was begun by Charles Mathews and Madame Vestris at the Olympic in the 'thirties. When they took Covent Garden in 1839, Planché, a learned herald and archæologist, superintended the costuming of their Shakespearean plays. When "Money" was produced at the Haymarket in 1840, Count D'Orsay guaranteed the correctness of the fashions. Again, during their Lyceum management of 1847–55, Mathews and Vestris gave a great deal of attention to costume and decoration. But at most theatres during the middle decades of the century the dressing was apt

to be slovenly, the scenery shabby, and the stage appointments meagre.

The Haymarket, during these middle decades, was managed first by Webster and then by Buckstone, the Adelphi for more than twenty years by Webster, and the Olympic for a certain time by Alfred Wigan, in conjunction with the "Edmund Kean of burlesque," the ill-fated Robson. This was the heyday of adaptations from the French, confessed or unconfessed. Douglas Jerrold, it is true, wrote some insubstantial comedies, and Westland Marston, who had been brought to the front by Macready at Drury Lane, produced some too substantial dramas in blank verse. Almost the only original play of the period that can be said to have survived is "Masks and Faces" (1852), by Charles Reade and Tom Taylor. The latter was a prolific playwright, but even in his original plays showed himself so entirely under French influence that they were indistinguishable from adaptations. His most famous original play was "Our American Cousin," which (with Sothern as Lord Dundreary) ran for 477 nights at the Haymarket; his most successful adaptation was "The Ticket-of-Leave Man." Dion Boucicault, who began his career in 1841 with an original but extravagantly over-rated comedy, "London Assurance," showed much more talent in his Irish dramas, "The Colleen Bawn" and "Arrah-na-Pogue," produced in the 'sixties. He was also one of the most indefatigable adaptors of the period. Perhaps the most original and characteristic productions of these years were the graceful extravaganzas of J. R. Planché. They were superseded towards the end of the 'fifties by the much less polished burlesques of the brothers Brough, Byron, Reece, and Burnand, and by French opera-bouffe; which in their turn gave way to the delightfully witty and melodious extravaganzas of Gilbert and Sullivan, and to the "musical comedy" of to-day.

In the burlesques of H. J. Byron and others at the Strand Theatre, Miss Marie Wilton won great popularity. In 1865 she entered into partnership with Byron to establish a new Strand Theatre in Tottenham Street, under the name of the Prince of Wales's; but the success of T. W. Robertson's first comedy, "Society," soon drove burlesque out of the bill, and Byron out of the management. Along with her husband, now Sir Squire Bancroft, Miss Wilton made the little Prince of Wales's the home of a new art of minutely realistic reproduction of what may be called drawing-room life. The "cup-and-saucer" comedies of Robertson, of which "Ours," "Caste," and "School," were the most successful, undoubtedly marked the first stirrings of a revival after the depression, and subjection to France, which had characterised the middle decades of the century. But the impulse seemed to die out in the 'seventies. Robertson's most promising disciple, James Albery, became a hack adaptor, and "cup-and-saucer" comedy degenerated into mere punning farce in such pieces as the legendary "Our Boys" of H. J. Byron. The Bancrofts, after vainly striving for some years to keep their theatre going with English work alone, fell back upon adaptations from Sardou. The methods of mounting, costuming, and acting, however, which they had perfected at the Prince of Wales's, spread to other theatres, under the management of Mr. and Mrs. Kendal, Mr. Hare, and Messrs. Clayton and Cecil, all of whom were included in the famous cast of Sardou's "Diplomacy." Thus the Bancroft management in reality prepared the ground for the new school of serious English drama which came into existence after 1885.

In the meantime new theatres had been springing up on every hand. The Queen's Theatre (Long Acre) was opened in 1867, the Globe and the Gaiety in 1868, the Charing Cross (afterwards Toole's) in

1869, the Vaudeville and Opera Comique in 1870, the Court in 1871, the Criterion in 1874. Not only the growth of London, but the great increase in its floating population brought about by the introduction of railways, tended to make the long-run system absolutely dominant. It was so when, in 1870, Henry Irving made his first striking success as Digby Grant in Albery's "Two Roses." Joining H. L. Bateman's company at the Lyceum in the following year, he firmly established his reputation in "The Bells," "Charles I.," and "Richelieu"; and finally, in 1874, placed himself at the head of his profession by his famous performance of "Hamlet." On December 30, 1878, he assumed the management of the Lyceum, and, associating himself with Miss Ellen Terry, made that theatre for many seasons the acknowledged home of poetical and quasi-poetical drama. The knighthood conferred upon him in 1895 was generally felt to be no more than an appropriate recognition of the dignified and liberal spirit which had from the first distinguished his management. Mr. George Alexander, whose management at the St. James's has meant so much to the modern dramatist, was trained in Sir Henry Irving's school. Mr. Charles Wyndham, on the other hand, and Mr. Beerbohm Tree, graduated neither at the Lyceum nor at the Prince of Wales's. Mr. Wyndham, after devoting many years mainly to French farce, has of late applied his incomparable talent, with the happiest effect, to original English comedy. Mr. Tree has from the outset of his management shown a laudable ambition, and has contributed many noteworthy revivals and productions to the record of the past fifteen years.

The most noteworthy feature of these fifteen years has been the growth of a substantial and far from despicable dramatic literature. It is a new creation rather than a revival; for it derives from the general

European movement rather than from any English tradition. The stage literature of to-day has nothing in common with the stage literature, if so it can be called, of Shiel, Knowles, and Talfourd. The last hope of any permanence for that school of drama vanished when Robert Browning's attempt to infuse intellectual quality into it proved, so far as the stage was concerned, a failure. Bulwer Lytton infused into it, not intellectual quality, but a touch of French vivacity and adroitness. His work, however, was too tawdry and insincere to revive a moribund form, which died out in Leigh Hunt's graceful "Legend of Florence," in the works of Westland Marston, and in a host of stillborn blank-verse futilities. When W. G. Wills, in 1872, produced (and printed) his "Charles I.," it seemed as though a new force were making itself felt; but the force soon declined into feebleness both of invention and of style. About the same time the paradoxical humour and remarkable, though curiously limited, literary faculty of Mr. W. S. Gilbert gave to the stage some fantastic comedies of real note. But Mr. Gilbert's talent is too peculiarly his own to form anything like a school. His imitators reproduced only the vices of his manner.

Meanwhile the practice of publishing plays had fallen almost entirely into disuse, mainly because few plays were written in any tolerable literary form, but partly, too, because publication facilitated piracy at home and in America. The legislative enactments and judicial decisions which enabled English dramatists to secure stageright and copyright in America were of momentous influence upon the drama. In the first place, they allowed dramatists to publish their plays without risk of loss, and so gave them a motive for cultivating literary form. In the second place "American rights" helped to enrich dramatic authors to a degree hitherto undreamt of, and thus set them free to launch out

into artistic experiment. Soon after the middle of the 'eighties the movement to which we owe the really remarkable modern plays of Mr. A. W. Pinero, Mr. H. A. Jones, and Mr. Sydney Grundy began to make itself felt. It was clearly perceptible before the production of "A Doll's House" in 1888 made Henrik Ibsen known in England; but no doubt the stimulating effect of Ibsen's genius has been felt in England, as it has throughout Europe. Still more important is it to note that about the time when Messrs. Pinero and Jones came to the front there was a marked falling-off in the supply of "well-made" and adaptable plays from Paris; so that if we were to have serious modern drama we were practically compelled to produce it for ourselves. In noting favourable external conditions, however, we must not overlook the main fact that the generation of playwrights which took possession of the stage about 1890 was far superior in absolute talent to any previous generation of the century. The modern English drama may be said to have come of age, to have assumed the *toga virilis*, in "The Second Mrs. Tanqueray," produced in 1893. Since that date progress has been rapid and almost continuous. The melancholy downfall of one brilliant writer gave the movement a momentary set-back. The death of Robert Louis Stevenson, too, finally dissolved that partnership with Mr. W. E. Henley which gave us "Beau Austin," and might, under more favourable circumstances, have given us many stronger, though scarcely more beautiful, works. But with Mr. Pinero, Mr. Jones, Mr. Grundy, Mr. R. C. Carton, Mr. Bernard Shaw, Mr. H. V. Esmond, Mrs. Craigie, Mr. J. M. Barrie, Mr. Louis Parker, Mr. Haddon Chambers, and Mr. R. Marshall all actively engaged in "showing the age and body of the time his form and pressure," the English drama is at last fairly holding its own with any other branch of literature.

One may assert, with all confidence, at all events, that the third-rate play of to-day is distinctly better than the first-rate play of twenty years ago.

It seemed until quite recently that the poetic drama was dead beyond hope of revival. During the long course of Sir Henry Irving's management at the Lyceum he had produced no new play of the slightest note except one or two of those belated essays in the Elizabethan form which had amused the illustrious age of Alfred Tennyson. There were such traces of genius in them as to make one regret that the great poet had not earlier turned his attention to the drama; but living plays they could scarcely be called. The dramatic works of Mr. Swinburne, "Michael Field," Mr. Robert Bridges, and other poets, were impossible from the stage point of view. But at last, in the fulness of time, there has arisen in the person of Mr. Stephen Phillips a writer in whom nobility of style is combined with true dramatic invention and a keen eye for stage effect. The production of "Herod" at Her Majesty's Theatre has been by far the most notable event of the last year of the century. For "Paolo and Francesca" the stage has still to wait.

On the whole, then, the state of the drama, as a branch of literature, is extremely encouraging. The commercial conditions of the theatre are far less satisfactory. The drama will never be able to develop in perfect intellectual freedom until there is in every great centre of population throughout the English-speaking world at least one theatre exempted, whether by private or municipal endowment, from the pressure of those conditions which create the actor-manager and beget the long run. The emancipation of theatrical art from the exclusive predominance of this system is not the least urgent of the problems with which the new century is confronted.

III

FICTION

BY ARTHUR WAUGH

THE history of the novel during the present century differs from the histories of every other form of literature in one important particular. In poetry, criticism, and the drama literary tradition was established and crystallised long before 1800; henceforth there might be developments and side issues, but the dominant principles of these arts could scarcely be disturbed. With the novel the case was entirely different. Narrative fiction has indeed played its part in English literature from the beginning, and from Malory and Sidney to Nash and Defoe had brought forth noble names and glittering performances; but it was not until Richardson published "Pamela" that the modern novel of character found a home in England; and English fiction, as we understand it to-day, was but sixty years old at the opening of the century. Sixty years is, indeed, a long period in the age of the individual, but in the history of literary development it is still a part of childhood, and at the outset of our inquiry we find the modern novel no more than beginning, as it were, to find its feet. The period was one of great interest and movement. The forces of the French Revolution, spreading themselves on this side of the Channel,

were arousing fresh intellectuality. Literature was no longer to be the privileged possession of Will's and White's; it was to be democratised for the advantage of a new and imperative public. The drama had declined; poetry had suffered for nearly a hundred years at the hands of artifice; the sudden stream of ideas demanded some new form of expression. What more natural than that the popular taste should swoop down upon that actual and nervous art in which Fielding and Smollett had already pictured contemporary life with such vigorous fidelity? The demand was for humanity, the study of ideas in life; and it was satisfied in the modern novel.

With the very commencement of the century the novel assumes its two main aspects, developed in two separate talents of radiant excellence; for the first names to meet us are those of Jane Austen and Sir Walter Scott. It has indeed been the singularly good fortune of the modern novel that, with all its traditions to make, it has made them at once, without hesitation or false start; and the first names of the present century are among its greatest. The genius of Jane Austen is without spot or blemish. Standing, as the truest artist will always stand, outside her characters, she looks them through and through with piercing infallibility. Her field may not be as wide as universal nature, but it includes almost every passion in the heart of man, and she regards the changeful and unstable emotions of humanity with kindly satire and critical sympathy. Moreover, she set a brilliant and most healthful example to her successors. Sweeping away the sentimental and sensational methods of Mrs. Radcliffe, Charlotte Dacre, Agnes Musgrave, and the crowd of folly, she wrote with clear and nervous restraint the record of actual life. Side by side with her stands Scott, the father of modern romance. With him prose-fiction was a second love; and in his abandonment of verse as

the vehicle of his Scottish romances, we see more clearly the gradual tendency of narrative towards a prose expression. "Waverley" appeared three years later than "Sense and Sensibility," and with its immediate and overwhelming vogue the fiction of the nineteenth century was blossoming from every branch. Chivalric, humorous, adventurous, humane, Scott revived the national interest in history, and perpetuated the manly types of the middle ages. His fingers may not be always closed upon the pulse of motive, his exuberant imagination may sometimes play havoc with proportion, but the gorgeous procession of heroic figures and noble escapades sweeps through his pages in a pageantry of splendour. And he, too, with his pervading popularity, cleared the ground of pinchbeck sensation and elementary melodrama.

Scott's vogue in the novel was even greater than in poetry, and the glamour of Byron soon took the town by storm, almost obscuring the glories of "Marmion" and "Rokeby." It was natural that the Byron movement should affect the novel too, and the "bigoted and truculent dandies" were not to leave fiction untouched. Nowadays we do not greatly read the stories of Benjamin Disraeli and Bulwer Lytton, but in their day they were immensely popular. Composed half of vain foppery and half of incisive wit, they rose above the level of their surroundings in moments of individuality, but oftener sank beneath it in overdecoration and efflorescence. They remain interesting rather as a picture of the time than as a contribution to literary development. The influence of Scott, which they momentarily diverted, has long outlived them. In England it lingered on in the turgid tales of William Harrison Ainsworth, and is always reappearing. In France it assumed new vitality in the dashing talent of Alexandre Dumas, whose spirited and illimitable imagination was second only to that

of his great English master, and followed very close upon his prowess.

Meanwhile, the gradual but widening influences of the English novel were issuing in a genius peculiarly popular and essentially British. The democratisation of literature reaches its apex in Charles Dickens, who has been perhaps the most powerful and permeating literary influence of the century. It is no wonder that he should have been so; for he is the sublimation of the Victorian citizen. In that marvellously diverse and luxuriant genius of his, the sentiment, humour, optimism, fear and aspiration of his time find complex and sympathetic expression. He possesses, as Taine perceived, the talent of a representative English painter; his energy for detail is equalled only by his wealth of interwoven colour. Above all, he has sincere and impeccable appreciation of the ideals and prejudices of the ordinary Englishman; he embodies his age, and expresses it with admirable and sensitive particularity. If his sentiment is sometimes drowned in sentimentality, his humour marred by grotesquerie, these are, after all, the foibles of his time. He takes a quality or a vice and works it into a character; the leaven spreads till the character is no longer a human being, but an embodied tendency, like one of Marlowe's Deadly Sins. But it was precisely thus that the early Victorian conscience was played upon most readily; he knew his public, and he filled it to the full. The spirit of Dickens permeates the literature of his time. With natural qualifications, it reappears in Lever, in Lover, in Samuel Warren, in Douglas Jerrold, and even in Marryat. A sudden wave of high-spirited middle-class optimism, drenched in a foam of caricature, overwhelms the coast; for ten years fiction is almost entirely given over to the dominant genius of Dickens.

There was bound to be a reaction, and in due time it came, starting apparently upon the Continent.

Early in the century Stendhal had prepared the way for it, microscopically analysing the passions through a glass of superficial naturalism ; and now the movement of modern realism centred itself in the similar, but divergent, talents of George Sand and Honoré de Balzac. In George Sand, idealist with her gaze upon reality, the inspiration passed from a passion for social enthusiasms to the study of humble and idyllic humanity. In Balzac, realist with a heart of romance, it took the form of eager but laborious examination of motive, an examination wide in its humanitarian sympathy, and conducted by a student of mankind, whose actuality was always illumined by broken shafts of imagination. The talents of the two writers were diverse, but they pursued the same aim. Life was to be viewed, as under the eye of Jane Austen, with uncompromising fidelity ; sentimentalism and buffoonery were to be set aside ; the heart of man was to be displayed naked and without shame. And so in England. That easy-going conception of the order of things which ended every novel with lovers united in marriage, and the prospect of illimitable progeny, was suddenly shocked and revolutionised by the voices of two women from a country parsonage. In Charlotte and Emily Brontë the passions were suddenly revealed, romantic, sombre, and importunate ; life was pictured as a stormy midnight scene under flashes of fitful lightning. And the world had scarcely made up its mind how to treat this sudden apparition of feminine revolt, when another sensation swept it off its feet. William Makepeace Thackeray was no novice in letters when "Vanity Fair" sprang into the light ; but it was only then that he was discovered as an invigorating and disturbing influence. He was, indeed, no revolutionist ; but, if Dickens was the child of his age, Thackeray was its critic, and the false sentimentality of the time found itself one

morning wittily rebuked by an acute and cynical study of nature. Thackeray is a very complex figure, difficult to fix, and harder still to analyse. By no means the cold cynic he has been sometimes represented, he stood rather as the sympathetic spectator of the follies of the day, removed from them by intuitive wisdom, yet always presenting to them the geniality of a tender critic and candid friend. He modelled himself on Fielding, and inherited something of his master's art both in construction and in presentation; but he was related always to his time, and has left us the most permanent picture of its characteristics. He, too, was followed by a school, not of imitators, but of disciples. In Charles Reade, dauntless opponent of social evils; in Mrs. Gaskell and Mrs. Craik, conscientious and intimate observers of simple life; and in Anthony Trollope, the voluminous painter of the English country home, the determination to see things as they are, and to portray them without prejudice survived and flourished with the ordered grace of a British garden. In America, too, the same flowers of sincerity and charm were growing. The genius of Nathaniel Hawthorne, incomparably the first of American novelists, combined in a rare degree the qualities of realism and romance, and sustained true observation side by side with imaginative fervour and idyllic susceptibility. The tradition thus maintained has done much to protect the modern novel from a decline into permanent eccentricity.

Such quiet methods, however, were not to remain unchallenged, and the search after truth of motive and accuracy of delineation has gone far since Thackeray. Upon the continent Balzac was followed by Flaubert, and in England "Adam Bede" was the successor of "Vanity Fair." In "Madame Bovary" and "L'Education Sentimentale" the new realistic movement joined hands with naturalism. Middle-

class life was depicted, not with the genial hopefulness of Dickens, but with all its angularities emphasised, its false gods upon the hearthstone. In "Adam Bede" a like elaboration of detail, laborious but selective, showed that the English mind was not unaffected by French method. George Eliot was, next to Dickens and Thackeray, the most prominent talent of her age, and in her own day she enjoyed both the privileges and the perils of a literary prophetess. By nature a woman of exquisite sensibility, rich and distinctive in emotional power, she grew, with the increase of her reputation, too self-conscious an artist and too deliberate a preacher. But her influence was broad and humane; it served its time well with fidelity to life and sincerity of purpose, and her earlier books will outlive the sense of weariness from which the recollection of her later assumptions of philosophy has scarcely yet broken free.

Up to the death of George Eliot it is possible to trace a certain clear course of development in the novel, to follow certain inter-related and inter-acting movements. But the literature of the last twenty years stands too close to us for criticism to say precisely whither the modern novel, with its multifarious interests, is tending, or what is to be its next predominating development. Indeed, during the last twenty years the activity of our novelists has been so increasingly complicated and confused that it becomes difficult to believe that any main current exists among the "shorn and parcelled" waterways. A few conspicuous figures, however, stand out in high relief. Mr. George Meredith has sustained, with noble integrity of aim, the best traditions of the novel of character and national life, irradiating his stories with the sense of vigorous vitality, and preserving in them the unity of purpose and the animating psychological idea, which are the infallible signs of sound workmanship. Mr. Thomas Hardy,

like George Eliot the historian of bucolic life, has tempered an observant realism with the breezes of the western woodlands and the song of nesting birds. For culture, seriousness, and distinction of style, Mrs. Humphry Ward must also be counted among George Eliot's successors. The mantle of romanticism fell on no unworthy shoulders when Robert Louis Stevenson was still among us, and the enthusiastic will believe that there are not wanting, among the younger generation, talents that promise to fill his vacant and lonely throne. Nor has the increase of political and imperial responsibility lacked literary expression. Few novelists have taken the field with so instant and far-reaching a success as that which has acclaimed the peculiarly British vigour of Mr. Rudyard Kipling's soldier-stories. He is, indeed, the most conspicuous figure among the newcomers of the last decade ; emphatic, impetuous, militantly aggressive, he has given voice to the contemporary passion for national acquisition and international power. A modern of the moderns, his is the trumpet-call of the young ambition of his time ; its possibilities and dangers alike are clearly mirrored in his stirring talent. For the rest, the most representative fiction of the time has probably come to us from abroad. In Turgenev and Tolstoy we have learnt to appreciate a realism, not naturalistic, but sincere, filling the stage with figures of infinite variety and complexity ; and employing all these figures to the development of a central and dominant idea. This movement is seen to be as nearly as possible simultaneous throughout Europe, and in certain countries it assumes a shape both menacing and uncouth. In Scandinavia it emerges in the militant enthusiasm of Björnsen ; in France it splits into two channels, following a course of unselecting, laborious exactitude in M. Zola, and in Guy de Maupassant issuing in a cynical humour, an exquisite manner, and an under-

lying melancholy both touching and persuasive. In Italy the movement crystallises in Gabriele d'Annunzio, lyrical, impassioned, and unstable, whose characters drift helplessly through a world that has cast away the claims of honour and dignity. And in our own way we, too, in England have had our passing movement of naturalism, tangled and absorbed among a complication of literary interests, half-perceived and early abandoned, but still in its hour sufficiently marked and unfortunately pervading. It has spent itself now, and English fiction seems again to be lost in a very wilderness of indecision. Tacking from topic to topic, viewing nothing steadily or long, tortured by problems of misunderstanding and ignorance, its progress seems for the moment to evade the eye of criticism altogether. Out of all this chaos we can but hope that some unity may come, when feverish emotions have cooled down into enthusiasm.

IV

THE ESSAY AND CRITICISM

BY HENRY W. NEVINSON

WE have been told to satiety that the century has been an age of criticism—an age that has questioned all traditions and refused to acknowledge any judgment which cannot hold its own against the assaults of modern scrutiny. Like theology, science, and fiction, the tendency of the essay has also been critical. It has brought its scrutiny to bear upon literature, art, and theories or traditions of life. Criticism in the highest sense of the word is in fact the function of the essay, and it is but natural that the "critical age" should be peculiarly rich in this art. The extraordinary development of reviews and magazines, which for the most part are made up of essays, is an evidence of the general tendency. It is true that from among the number of true essayists we must exclude all writers whose first object has been to give information rather than to produce works of art. That artistic expression of personality which we may briefly call style is essential for the essay, and like all art the essay is therefore rare. Yet within this century essayists who have reached a high rank have been unusually numerous, and it is not possible here to mention much more

than the names even of those who most deserve remembrance.

At the very beginning of the century the essay was at a rather low ebb. Periodicals like the *Gentleman's Magazine* and the *European Magazine* were occupied with miscellaneous information, news, gossip, and antiquarian chatter and brief notices of long-forgotten books. But in 1800 Wordsworth had published the Preface to the second edition of the "Lyrical Ballads," a critical essay which was to open the road for a new method of criticism as well as of poetry, and in October, 1802, Sydney Smith originated the *Edinburgh Review*. Jeffrey wrote the first article, and, succeeding Sydney Smith in the next year, remained editor for a quarter of a century. The *Edinburgh* aimed at a firmer basis for criticism. As Jeffrey said, "it professed to go deeply into the principles on which its judgments rested." In rivalry to it John Murray brought out the *Quarterly Review*. Historically the style of criticism in both was a development of Johnson's "Lives of the Poets" and some of the critical essays in the *Spectator*. Of the essayists, including Brougham and others, who wrote for these reviews, Macaulay has probably been the most read, and has most deeply influenced the language and thought of the time. But all are, like himself, characterised by a desire for perfect clearness and good sense, combined with a large amount of information, and a certain dignity of thought and diction which in those days seemed less rhetorical than we are inclined to think it now. The *Edinburgh* itself was considered very Liberal, and in a few instances it was quicker than most critics in recognising the new departures of genius. All are familiar with the mistakes of the authoritative critics of the time, and the harm they sometimes did with the heavy strokes of the common-sense bludgeon. But at all events they restored and maintained the serious-

ness of literature, and stood firmly against the inroads of obscurity and extravagance.

Side by side with these, some essayists of a different character had arisen. The names of John Wilson ("Christopher North") and De Quincey are associated with *Blackwood's Magazine;* Hazlitt and Leigh Hunt with the *Examiner.* They also were critics of literature, though their criticism was marked by greater intimacy and personality of tone. But their most distinctive work was rather a "criticism of life" than of literature, and they thus carried on the tradition of the *Spectator*, Sir Thomas Browne, Bacon, and Montaigne. They were all humorists and discussed the varied phases of life with a humorous admixture of learning, pathos, and playfulness. His strange though intermittent power of imagination, combined with subtle rhythm and harmony of sentence, raised De Quincey above the high level of the others, and keep his few small masterpieces fresh in memory. But to the same general class Charles Lamb belongs, and his fame has inevitably overshadowed the rest. His essays were chiefly contributed to the *London Magazine* (1820 and onwards), and in an essayist's gift of expressing a beautiful, interesting, and unusual personality he has few equals. There is no writer with whom we are more intimate. He dared to lay aside all conscious thought of dignity and to show us the weaknesses as well as the strength of himself and other men. Over the common things of life, and especially of memory and boyhood, he threw an enchantment made up of truth and sympathy and pathos, combined in an atmosphere of a humour that would have been melancholy but for the necessity to laugh. It is characteristic of the man that his letters are the same as his essays in tone, and almost as valuable. In them is contained some of his finest criticism, and on English literature he was one of the first of modern critics.

While Lamb was still at his best, the extraordinary influence of Carlyle began to make itself felt. To the stern seriousness of the Dumfriesshire peasant he added the savage indignation of Swift, transfigured by an impassioned tenderness which yearned over the mingled grandeur and pettiness of mankind. Like other writers in the *Edinburgh*, he began with critical essays, and with Coleridge was among the first to draw attention to the poetic and philosophic movement which raised Germany for a time to the forefront of European thought. But except when he treated a subject like Burns, coming very close to his own personal life and knowledge, his strength did not lie in literary criticism, and he soon turned to wider themes, producing in "Sartor Resartus" a connected series of essays which place him in the century's front rank for satire, speculation, and passionate humour combined. His later essays were chiefly occupied with political subjects, and formed the first and finest protest of socialistic revolt against the chilly and abstract Liberalism which sought to reduce men and women to terms of statistics and machinery. Carlyle's purpose was carried on with subtler irony and an idealist's paradox by his disciple Ruskin, especially in the series of "Fors Clavigera." Ruskin's work belongs both to art and economics, which he profoundly influenced, but his style is the essayist's style, full of personality and charm, and even when he is apparently engaged in giving information, his "criticism of life" underlies the expression. Of literary critics he was also one of the subtlest and most penetrating in analysis. Carlyle and he between them gave to our language a power, irony, and graceful familiarity which are permanent in effect in spite of the disservice of many imitators.

Emerson was connected with Carlyle by friendship, by seriousness, and insistence upon individuality, though differing in almost every other quality of style and

thought. His detached sentences, often contradictory, show an aloofness from the world strangely mingled with American common sense. There is a tolerant quietism about him, a fatalism that is always hopeful, an unruffled confidence in the intellect and general righteousness of man. Thoreau was more akin to Carlyle, Ruskin, and Wordsworth in his ambition to get close to the common things of earth, reducing external life to its lowest terms, that the soul might move more freely. In so far as he can be called an essayist, George Borrow may be placed in the same group. From the point of view of a townsman, Thackeray's essays had a similar aim. So had Matthew Arnold's ironic onslaughts upon uncultured Philistinism. So had Schopenhauer's "Parerga," though the satire upon the foolish usages of mankind was more savage, and he inclined to abandon the hope of virtue as well as of happiness. But it was in the later essays of Tolstoy that this view of life reached its most consistent expression, pessimistic indignation there finding a solution in the literal application of a few simple principles to life, regardless of civilisation or the material progress of society. On the whole perhaps it is this wide and divergent group of essayists which has most profoundly influenced the time, but the result of their work belongs rather to economics than to art. In violent contradiction to their tendencies of simplicity, equality, and compassion, stand the random outpourings of Nietzsche with his worship of self-seeking genius and the individual power under which common mortals should rejoice to be overwhelmed.

Returning to literary criticism, we find in Heine's essays on German literature a new and intensely personal method of treatment, full of fine irony and humour, but poetic at the same time and faultless in judgment. Sainte-Beuve's criticism is more impersonal, more strict and definite in form and result.

Side by side with it we may group the best purely literary criticism of the middle century and the end —the work of John Morley, Leslie Stephen, Mark Pattison, Edmond Scherer, and, with certain differences, Taine, Lowell, George Brandes, and Addington Symonds. Matthew Arnold was a professed disciple of Sainte-Beuve's school, but his poetic mind and a genius for social and literary definition bring him nearer to Heine, and his most literary criticism is continually running over into the criticism of life. Under this heading come the scholars who have devoted the greater part of their lives to the service of certain great masters, as Spedding devoted himself to Bacon, Masson to Milton, Halliwell-Phillipps and Sidney Lee to Shakespeare. Besides these the leading literary biographies of the century have been Lockhart's life of Scott, Lewes's Goethe, Carlyle's Sterling, and Froude's Carlyle.

Washington Irving, who was a contemporary of Lamb, comes to some extent under the same tradition, and Oliver Wendell Holmes touched the common things of life and literature much as Leigh Hunt, but with a finer and more frequent humour. The more recent masters of the essay which is written primarily for charm were Dr. John Brown and Stevenson, both being poetic humorists and intermingling fine passages of criticism with characteristic memories of the past, and brilliant sketches of the pathos and laughter in ordinary lives. The diary of Amiel is a true series of essays on life, revealing a soul steeped in the melancholy of thought and inactivity, endowed with a delicacy too sensitive for happiness, and tormented by an unsatisfied desire for spiritual assurance—all qualities characteristic of much of the century's thought. In Maeterlinck a similar temperament seeks consolation in the profound, though perhaps melancholy, conditions of soul

which are open to all mankind apart from external circumstances. He insists as earnestly as Emerson on the greatness and self-sufficiency of the individual mind wherever it is placed. But his hope for man is less assured; he has less of the sensible optimism which, even in Emerson's case, was sometimes rather deliberate. Walter Pater, possessed by the kindred melancholy of the time, but with mind more concrete and with a finer sense of external beauty, sought the value of life in the highest creations of art and the contemplation of the truest beauty which man had produced from age to age; but this beauty he ultimately found most definitely in the clearness and tranquillity of soul to be gained by the rigorous and ascetic pursuit of any high form of perfection, whether in the rarest art or the every-day conduct of life. His essays are among the best critical works, and deal sometimes with separate minds, sometimes with marked epochs of thought, especially just at the origin of new movements, before the old order had outwardly broken up.

In letter-writing, which is the essayist's art in an unconscious form, this century has not been so distinguished as the last. The falling-off is due to the brevity and frequency introduced by the penny post, to the hurry of life in the large towns, and to the increase of magazines which now pay for a skill that might have been put into letters before. Yet besides Lamb's letters, Byron's are among the best in the language, and so are Edward FitzGerald's. All Carlyle's letters and the correspondence between him and Emerson are worthy of the writers, and Jane Welsh Carlyle was the unconscious artist of a brilliant and intimate style.

As a whole we may say that the tendency of the essay during the century has been to greater seriousness and wider humanity. The greatest essayists, unsatisfied with the superficial aspect of life and

society, have reached deeper levels of thought, seeking both in criticism and spiritual things for principles of surer guidance than the fashion or convenience of the day. At the same time their sympathy has been far extended, so as to include all classes of men and phases of nature. Humour has played a greater part than with previous essayists, but it has been a humour deeply tinged with the pathos of mortality, and born of a sympathetic sorrow rather than laughter. While carrying forward the rights of individual thought, so that no social convention or accepted opinion has been safe from their examination, the essayists have been broadly human in tendency, drawing their themes from the common life of the world, or appealing in their criticism to emotions which are the common property of all who are not insensate.

V

MUSIC

BY G. C. ASHTON JONSON

THE most striking fact in the history of music during the nineteenth century is the absolute supremacy of the German nation in every branch of the art. In the first two decades Beethoven, continuing the developments begun by Hadyr and Mozart, carried instrumental music in the forms of sonata and symphony to a perfection which has never been surpassed. In opera Gluck, Mozart, and Weber were followed by the greatest genius of the century, Wagner, who, in his later works no less than by his writings, profoundly modified all previous conceptions of the scope and functions of music and dramatic art. Song-writing may be said to have begun with Schubert, and in no other country can an equal be found to him or to his worthy successors, Schumann, Franz, and Brahms. Even in oratorio, which has been since the days of Handel a peculiarly English institution, another German, Mendelssohn, holds the highest place, whilst in the dramatic, sacred and secular cantata, which has so largely taken the place of the oratorio, no other nation has produced anything to compare with Brahms' "Schicksalslied" and the "Deutches Requiem."

In following the developments of each branch of

the art we cannot fail to see that the leading tendency of the century has been away from what is known as absolute music, that is to say, music founded on march and dance forms, and towards an ideal in which the vitalising breath is some direct poetic inspiration. The symphony in its origin was a series of dance-forms. Hadyn first gave it definite importance, and Mozart then added a deeper musical feeling, and further enfranchised it. Beethoven's two first symphonies, though strikingly individual, are not much in advance of Mozart's finest work, but in his third symphony, the "Eroica," we see how the definite human inspiration of his regard for Napoleon at once lifted the form to a height till then undreamt of. The flowing tide of human emotion swept in, and in the fifth (C Minor) symphony all formalism was cast aside, and though still keeping within the classical form Beethoven expressed the moods and struggles of a noble nature, rising triumphant over fate. In the Sixth, or Pastoral Symphony, we have an example of what is called programme music. This is a much misused term, it being generally associated with absurd and unworthy realistic imitations of things in their essence inexpressible in music; properly used it should signify all music depending for its inspiration on some definite poetic intention; the name or description of the piece on the programme, thus putting the mind of the hearer *en rapport* with the intention of the composer. With the Choral Symphony Beethoven carried instrumental music to its limit; the three first movements are weighty with inarticulate emotion, and in the final movement, Beethoven, unable to give full scope to his intentions through instruments alone — after making his 'cellos and basses almost speak—sweeps them aside and entrusts the "Ode to Joy" to the human voice.

The Symphony in his hands reached its limit as an

art form. Other composers have written magnificent symphonies, notably Schumann and Brahms, and lately the works of Tschaikowsky and Glazounow have attained cordial recognition, but in no single quality do they transcend the work of Beethoven. Beethoven's successors in retaining the form have compromised between their respect for the classical traditions and their desire to give fuller scope to their poetical inspiration. Others, again, have broken free from the form and have written symphonic poems, like Liszt and Siegfried Wagner, of which the more immediate forerunner was the concert overture; this originally following the lines of the first movement of a sonata, gradually liberated itself to pursue more freely the expression of its poetic or dramatic content.

The actual orchestra has developed considerably since the time of Hadyn. Mozart first used clarinets in a symphony, Beethoven introduced the trombone in the finale of his Fifth Symphony, and the piccolo and double bassoon were then added. Other improvements have been chiefly in the direction of mechanism and tone colouring, while as regards the use of the instruments Berlioz and Wagner are responsible for the magnificent sweep and range of the orchestral resources which are now at the command of our composers, and which conductors like Richter, Mottl, and Henry Wood control in so masterly a manner.

When we turn to dramatic music we come at once to another of the salient features of the century, the supremacy of Wagner. What he accomplished makes every other composer's work seem puny in comparison. In his music-dramas we see the tendency of music to be more and more expressive of ideas, carried not only in intention, but in actual accomplishment to a point beyond which no further advance seems possible. This he was enabled to do

by the dual quality of his genius, for he was not only a composer but a poet, and the world may have to wait for centuries before any one similarly gifted may again arise. There is not a department of the art which he has not influenced. He is the founder of the modern school of conducting; he revolutionised the orchestra, introducing the ternary system of orchestration by which he was enabled to get chords of one tone colour; he planned and built a theatre at Bayreuth, which should be the model for all opera houses; he created new ideals for singers, and so supreme is his power that an artist who aspires to the highest rank can only reach it by proving to be a worthy exponent of some of the great characters of his dramas. By the use of the system of "Leitmotiv" he added a new form to music that increased tenfold its power of expression, and he practically killed what is known as "Italian opera," that is to say, operas in which the music existed as an end in itself and not as a means of adding expression to the poetic content of the drama.

Just as Beethoven is supreme in the symphony, so Wagner reigns undisputed in the realm of dramatic music. The "Flying Dutchman" was first produced in 1843, and saving his three early tentative efforts there is not one of his works which is not fuller of vitality now than the day it was produced. "Lohengrin" and "Tannhäuser" are the main stand-by of every opera-house, and year by year sees an increasing appreciation and a larger number of performances of the great music-dramas of his later period, "Tristan," the "Meistersinger," and "Der Ring des Nibelungen."

After the reforms of Gluck, whose works with Mozart's are the only survivors in opera from the last century, the Italians set themselves more steadily than ever to the art of writing catchy tunes which, sung by singers with wonderful voices, like Grisi, Mario, Rubini, and Lablache, drove fashionable

audiences frenzied with delight. Rossini, Donizetti, Bellini, and Verdi, shared the only successes of the century between them, and the latter, who subsequently became strongly influenced by Wagner, has of late years done much finer work—witness his "Aida," "Otello," and "Falstaff." In France the best work was done by Auber and Spontini. The Parisians have always shown a preference for grand spectacular performances, and this was provided for them most successfully by Meyerbeer, who showed commendable skill in marshalling all the forces of display. His work is often imposing, but always pretentious, with much sound and fury signifying nothing.

France has always been the home of opera comique, that is opera with spoken dialogue between the musical numbers, and many worthy efforts culminated in such works as Gounod's "Faust" and Bizet's "Carmen." The strong dramatic stories of these two operas go to prove again the fact that in dramatic music it is the poetic "stuff" that is the vitalising principle. We see this also in the more recent works, such as Berlioz's "Faust," Mascagni's "Cavalleria Rusticana," and Leoncavallo's "Pagliacci."

England can hardly be said to have added anything of serious import to dramatic music, though in lighter work there is much of which we can be proud. In the Savoy operas of Sullivan we have clever, graceful, attractive works, eminently English, and of considerable merit and vitality. Sullivan's most ambitious effort, "Ivanhoe," was comparatively not so successful, but those who recollect Mr. d'Oyley Carte's scheme for an English opera remember with regret both this and the very charming "Basoche" by Messager, one of the best of the efforts of the French composers in the school in which they are so successful, and in which Massenet, Lalo, and Delibes are prominent.

To return to Germany, Beethoven's "Fidelio" stands out, as one would expect his one dramatic work to do, as superb, and yet as a stage work, and in spite of some sublime music, it is not entirely successful. Weber really founded the German opera, producing in "Der Freischütz," a masterpiece thoroughly and characteristically Teutonic. Both Schumann and Schubert tried their hands at opera, but the genius of the one was too essentially lyrical, and of the other too introspective, to allow them to write successfully for the stage. Nicolai in the "Merry Wives of Windsor" and Cornelius in the "Barber of Bagdad" produced excellent operas, but these, like all other German efforts, are overshadowed by the achievements of the great Bayreuth master. All the musical dramatic work of the latter half of the century has been more or less influenced by Wagner, but so far, "Kunihild," by Cyrill Kistler, is, we believe, the only work that has actually been written in the form of a Wagnerian music-drama, and, good though it is, it is more of a worthy imitation than a work showing any distinct development. In the "Bärenhauter," Siegfried Wagner has shown great promise, and as his undoubted powers mature we may look to him confidently for better work.

Oratorio, another great branch of musical achievement, was temporarily killed by Italian influences, but it received an enormous stimulus by the production of Mendelssohn's masterpieces, "St. Paul," "Elijah," and the "Hymn of Praise." Here, again, especially in the "Elijah," the increasingly dramatic tendency of music was most clearly shown. Our many musical festivals have given great chances to our English composers to produce works in the style of oratorio. The tendency, however, has been away from sacred, and towards secular subjects, and of the treatment to become more and more dramatic. The number of noble poems in our language suitable for

musical settings also afford great opportunities, of which composers like Villiers Stanford, in his fine setting of the "Revenge," have taken advantage. Sir Hubert Parry has written fine examples of cantatas in his "Job," "Judith," and "Blest Pair of Sirens," as has Elgar in his "Dream of Gerontius" and "Caractacus," while abroad Brahms's "Requiem" and Dvorak's "Stabat Mater" hold the highest place in this class of work.

The art of song-writing may be said to be entirely a growth of this century. Schubert was the father of the modern Kunstlied, or art-song, as opposed to the ballad, in which all the verses were sung to the same tune. Songs like "Der Erlkönig" and "Der Wanderer" opened up a new world, and here again the direct poetic inspiration of the words and the more poignant expression of the emotions are the guiding factors in the development of the art. Schubert is the foremost lyric song-writer, but he is worthily followed by Schumann, and the art in Germany in the hands of Franz, Jensen, Lassen, Dvorak, and Brahms has remained on a consistently higher level than in any other country, though Grieg and Rubinstein would take a high rank even in Germany. Grace, refinement, and delicacy, combined with much delightful melody and considerable dramatic feeling, would seem to be the leading characteristics of the French song-writers, of whom Gounod, Massenet, and Godard have been the most prominent. In England at one time song fell to a most degraded position, but though the standard of English taste in song is still seriously below that which obtains in orchestral music, that is not the fault of our best composers, many of whom have written really good songs that are becoming increasingly appreciated, notably those of Villiers Stanford, Cowen, Maude Valerie White, Frances Allitsen, McCunn, and McDonell Davey, while of those

from whom we can confidently look for the highest class of work one may mention Arthur Somervell.

Both for the piano and violin the tendency has been to leave the strict form of the sonata, which again, like the symphony, had been developed to its highest possible expression by Beethoven. In his Sonata Op. 110 there is a passage in recitative form almost as if the piano were trying to speak, and later on Schumann shook himself free of classic bonds and wrote pianoforte pieces in every variety of character and form. His fantasia in C is illustrative of a verse of poetry by Schlegel, and most of his pieces have a definite title indicative of their intention. Chopin is perhaps the greatest writer for the piano the world has so far seen. Although he wrote as a virtuoso, the difficulties of technique in his pieces never seem to be put in to astonish or to show off technical accomplishment, but appear to be a necessary and integral part of the work. He raised the dance-form of the Polonaise, Mazurka, and Valse to an art-form, and his Ballades and Nocturnes are, out of the classical mould, the finest pieces written for the piano by any composer.

No individual instrument has developed so much during the century as the piano; Beethoven seems to have divined what the piano would become when he wrote his great sonatas. The improvement at the hands of the great makers, Steinway in America, Bechstein and Blüthner in Germany, Erard and Pleyel in France, Broadwood and George Rogers and Sons in England, has been something phenomenal, and the spread of pianoforte playing and with it true musical culture is another of the special features of the century. The organ, too, has been wonderfully developed during the century, the many ingenious mechanical contrivances that have been invented adding immensely to the scope of the instrument.

There have been many remarkable virtuosi in every

branch of the art, but it is impossible within the scope of this article even to begin to mention the most celebrated. In conclusion, in looking back over the century and seeing the marvellous development that has taken place, it is difficult to imagine that the next hundred years can be as full of achievement. That what is written shall be good of its kind and that the divine art of music shall not be dragged down and degraded by association with vulgar and unworthy words and ideas is the thing to be aimed at. The next century is more likely to be one of discovery and mechanical invention than of great literary or artistic achievements, but let us hope that music will more and more be made part of our daily lives, and of our children's education.

VI

ART

BY JOSEPH PENNELL

HISTORIANS, for their convenience, have pigeon-holed art according to centuries. But nothing is more difficult than to draw any sharp line of division. The centuries, in art as in literature, overlap. David and Classicism did not die in 1800, nor did 1801 see the birth of Romanticism. There is the further difficulty in considering a period through which we have lived, that it is too soon to see things in their true proportion. It is impossible as yet to say if the movement of the moment will help to make history, or prove but an ineffectual flare. The past shows how reputations that have endured a hundred years may, of a sudden, crumble into dust.

But still, it must be plain to every one that the development of art during the century has been marked by certain characteristics and phases. Most people will say that it has been, above all, a century of revolt. It opened with the flight of the German Nazarenes, under Overbeck and Cornelius, to Rome and the Primitives, and, though their art was as dull as their lives were amusing, they inaugurated a spirit of rebellion which, with intervals of inaction, has continued in their own land to the present day, and to what is thought to be the very modern—but is

really the very old—Secession of Munich and Vienna. The battle-cry was taken up with greater vigour and gaiety, and, fortunately, greater talent, by Géricault, Delacroix, and the Romanticists in France, who led the way for Plein-airistes, Impressionists, Pointillistes, and a succession of gallant young Seceders and Innovators and Independents—they too as old, as bound by tradition as they fancied themselves modern and emancipated. Even England, where disaffection spread slowly, where artists remained for long slaves of the patron, woke up when, one day, Ford Madox Brown came back from the Continent with a whole revolution "in his handbag," and the pre-Raphaelites proclaimed themselves rebels. But then, the history of art in any and all centuries has been little more than the history of revolt. There were rebellions and revolutions, a returning to old conventions, and a search after new dogmas—which are the old—long before the nineteenth century. The only difference, perhaps, is that never before has revolt been so self-conscious and undertaken with such apostolic zeal; never before has its literary record been so exhaustive, so inspiriting, and rarely, such good reading. But now that the roar of battle has ceased, now that the smoke has blown away, we can see how very little has come of revolution. No one any longer looks at the pictures of the Nazarenes, and the Secessionists are entangling themselves in their own affectations. Some Frenchmen who were thought giants in 1830 exist only in the printed praise of their adorers, some who were disdained as protégés, or dwarfs, fill the niches that the notorieties of the day were believed to occupy, while the Paris Exhibition seemed a proof of the passing of the phase of so-called Impressionism. Pre-Raphaelitism ceased with Rossetti. And the figures that already, in our eyes, tower above the heads of their contemporaries are those of artists

who led no revolt, though their rebelling disciples may have insisted upon honouring them as leaders—artists like Constable, Corot, Menzel, Fortuny, Whistler, Manet, Degas.

Far more characteristic of the nineteenth century than secession and rebellion is the growth of the national and local support of art. Though it probably will surprise most people, the establishment, or, at least, the nationalisation of the great museums of art belongs to this century. In the first half the National Gallery and the British Museum were made, while the second half can claim institutions like South Kensington and the National Portrait Gallery. Abroad, if the foundation of the Louvre and the nucleus of the galleries of Rome and Florence and many of the royal collections of other Continental capitals may be referred to an earlier date, their expansion and their conversion into public museums is the work of our own century—work to which Napoleon and Louis of Bavaria gave the principle incentive. In America, no matter what the age of the older academies, all active development belongs to the last twenty-five years. The collection of pictures by the Rulers of State is no novelty; the collection and public exhibition of pictures for the supposed benefit of the people is the new thing. For instance, there have long been pictures at Hampton Court, but, until comparatively recent years, they were no more visible to the public than those of Buckingham Palace are now. And this is as true of almost all the great galleries of the Continent. The Church, at first, was the only democratic patron of the Fine Arts, and to the Church alone the people went if they wanted to see the artist's masterpiece. But gradually everything was thrown open to the people, who showed so little appreciation that the result was the attempt to educate them in art. Public art education, offering

as inducements prizes and scholarships, is expected, in some mysterious way, to take the place of the apprenticeship of the Middle Ages. This universal cultivation, with the consequent multiplication of the amateur, and the growth of countless artistic societies and endless exhibitions, must be pointed to by the future historian as essentially characteristic of the nineteenth century. Whether he will be able to claim good as the fruit of this new departure, who can say, until a hundred years or more have passed? Up to the present the nationalisation of the great galleries of the Fine Arts, the opening of museums of the Applied Arts, the general teaching of all the Arts, have proved more notable than the achievement of the army of students under this new paternal rule. Art is not democratic, nor are artists made by State and municipal encouragement.

More legitimate and less artificial is the development for which the printing press is responsible. The real art of the century is the art that is everywhere, and, in consequence, scarcely noticed: the art that has succeeded the broadsheet and the chap book. For while it is impossible, and always will be, let us hope, for the sake of the artist, that painting and sculpture and architecture should descend, as in a cloud, upon the people, the whole world might be covered with the illustrated books, magazines, and papers that have become so popular. Illustration has been developed in this century as never in the past. Its first impetus came with Senefelder's discovery of lithography, and the good use made of the new medium of popular expression by a host of artists in France, from Charlet to Raffet, from Carle Vernet to Daumier, from Achille Devéria to Gavarni. A further stimulus was the invention of wood-engraving, Bewick's pupils spreading his methods, both at home and abroad, until Menzel, in Germany; Meissonier, the Johannots, and a whole school of

draughtsmen in France; and, eventually, Houghton, Millais, and the men of the 'sixties in England, gave the art of illustration an importance and popularity that so far had been unrivalled, and has since been equalled only by its later practice in America. And, finally, the last few years have seen an enormous increase in facility of reproduction by the turning of photography into an aid and an assistant to the illustrator. Process, in connection with various improvements in the printing press, and the cheapening of paper, has brought pictures to the people.

This triumph of illustration has revived interest in the book. When steel engraving was in vogue in the beginning of the century, and Turner invented Rogers's Poems, and many a little masterpiece found its way into the "Keepsakes" and "Books of Beauty" which we affect to despise; again, when the beautiful wood engravings of the 'sixties were filling volumes that are to-day the delight of the collector, little care was taken of the book itself. Printing was indifferent, binding was abominable, and no one thought of the spacing of the page. But, in this respect, the last quarter of the century has accomplished the most wonderful change. Printers like Constable, the Chiswick Press, Ballantyne and Hanson, are artists in their best work. William Morris's Press, followed by many imitators, has had its influence far and wide, until stupendous performances now pour in upon us from America and the Continent, witnesses to the danger of mannerism and affected archaism in any art. Commercial binding has improved; and there have been bindings by the artist that can vie with the triumphs of earlier craftsmen, though here again is a touch of affectation, a suggestion of self-consciousness that threatens, in the end, to lead to over-elaboration and disaster.

It seems, in innumerable other ways, as if the new conditions of the century had their influence. Art

once within the reach of but a limited few, began to express itself in forms not beyond the aspirations and pockets of the large commercial and professional class. As the demand for frescoes and mural decorations to adorn great churches and palaces grew less and less, artists produced work that could find a place in the home of the ordinary citizen. It was toward the end of the last century that Girtin, Turner, and a group of students less famous, used to meet at Dr. Monro's house in Adelphi Terrace, but it was not till the beginning of this, that, thanks to them and their followers, there was developed the art of water-colour, always supposed to be essentially English. Later on came the revival of etching, and etchings and engravings of all sorts have since been published in numbers that prove their popularity, only weakened upon the appearance of the still more popular—because cheaper—photogravure. But more marked still is the decorative movement that belongs almost entirely to the second half, if not to the last quarter, of the century. With the Victorian Era the abomination of desolation had set in, and our escape from it is, in some measure, the result of the labours of William Morris and the little shop in Red Lion Square. That the thing was carried to an extreme by Morris himself, that the latest follies of the decorator as exemplied in Arts and Crafts shows and the Paris Exhibition, almost make us long for the relief of horsehair and whitewashed walls, cannot be denied; but it is also certain that, up to the present, the gain outbalances these exaggerations, and if in household decoration our century cannot compete with the eighteenth, at least, at its close, it has been freed from the barbarism of its middle period.

With this development of art in the direction that meant greater popular interest in it, there came such a growth of art criticism as had never been dreamt

of in earlier ages. It began with Ruskin, whose eloquence carried all things before it. Ruskin was a poet, and his books will always be read for their poetry; he was an artist, too, and knew what he was talking about, except when his prejudices blinded him to everything he did not want to see. But his influence, unfortunately, encouraged the cheap talk of the incompetent about art. Hamerton was a serious, sincere compiler of facts. And now and then there has been a professional critic, equipped with the necessary knowledge, insight, and enthusiasm, like the late R. A. M. Stevenson here, or Ary Renan in France. But the world has been deluged with the writings of the inconsequent, the serious, and the cultured, who have done their best to degrade art to their own level. The hack and the scientific critic have succeeded writers of the distinction of Gautier and Fromentin, and the charm of Ruskin.

I might also point out that no review of the century would be complete that did not take the Japanese invasion into account, so strong a hold has it had upon painters, illustrators and decorators. I might point to the very recent revival of sculpture and architecture, but to this we are still too near to judge of its sincerity or importance. Besides, enough has been said to prove that the chief characteristic of the century is the striving to bring art to the people by the multiplication of public galleries and exhibitions, the effort to encourage public art education, and the increased practice of arts the public can afford to patronise. So far, it must be confessed, disappointment is the principal result of all this activity. The real value of the experiment, however, can best be decided by the critics who will have to sum up the characteristics of the twentieth century. As to pronouncing upon the future position of the men who have lived and died in this century, that is more than I should dare to attempt. To weigh Constable and

Turner in the balance, to judge between Rossetti and Millais, to place Alfred Stevens, to set up a shrine to William Morris, even to prolong such a list, will be the task of some one a hundred years hence. History is not manufactured while you wait, but the materials for history have been more abundant in our century than ever before, and it is for the future to turn them to just account.

VII

HISTORY

BY J. A. NICKLIN

HISTORY is both a science and an art. That fact alone makes the task of resuming the century's "Historiography" peculiarly difficult. Not that I have any intention of balancing brilliant writing against learning and research, but, in selecting the main lines of progress, it often happens that one has to choose between the real originator, who would be entirely unknown to the general reader, and the literary exponent who came into the movement later in the day. History, too, as a science, has enlarged her borders so much during the nineteenth century that I shall be in constant peril of encroaching on the domains of the archæologist, the jurist, the sociologist, and even of the theologian.

The nineteenth century started its career rich in ideas and tendencies that were destined to influence the science of history. There was, in chief, the Romantic reaction against the spirit of the *Aufklärung*, that eighteenth century spirit which despised the past, and had set up an absolute standard by which it condemned all that appeared anomalous. This reaction took many forms. A new interest in the Middle Ages, having its rise in Germany, was seized upon by the triumphant imagination of Walter Scott,

and became a fruitful source of new aspects and combinations. With the sympathetic attitude to mediævalism went a curiosity which drew men to exotic literatures, especially the Scandinavian and Indian, and from this eventually was born the comparative method of examining Language, History, and Mythology, with their kindred problems. The great jurist Savigny left an indelible mark on historic methods. He abolished the law of nature, which had been the motive of 1789, and substituted the law of nationality, the motive of 1848. The absolute standard of the eighteenth century was broken down. Institutions were to be judged, not from an *à priori* point of view, but from their relation to the traditions and character of the race. It was this which Burke had so long been proclaiming, when he would have been a voice crying in the wilderness, had he not been mistaken for a vociferous Tory.

From the eighteenth century there had come a practical interest in constitutional questions, exemplified by Montesquieu and the apologists of 1688, into which, at the last moment, Adam Smith had insinuated a sharper analysis of the causes of national prosperity and decay. And, besides all this, Wolf, in his prolegomena to Homer, had handed on the potent seed of historical criticism.

In Hallam's "Constitutional History" we see a survival of the eighteenth century, as also, in a less degree, in Guizot's "English Revolution," while the much later Roman history of Dean Merivale was wholly inspired by Gibbon. Even Tocqueville's "Democracy in America" has something of Montesquieu in it, though we feel the Hegelian leaven working in its comprehensive generalisation.

Niebuhr was inspired by the ideas of Wolf. He tried to apply the same analysis, under which the unity of authorship of the Homeric poems had dissolved, to early Roman history. It was one of

the first applications of the critical method, but Niebuhr only recognised one side of that method. His principle was that truth is not hopelessly buried under tradition, but that the reality could be disentangled from its encumbrances of myth by the observation of apparently fixed laws of development. That principle was only efficacious in dealing with very early times—with pre-historic history. A further advance in the method was made by Böckh. He was the first historian to see the value of inscriptions, and his treatment was marked by the suppression of personal bias.

It was a fairly easy matter for Böckh to eliminate the personal equation from discussions of Athenian Weights and Measures. For Ranke to investigate creeds and struggles and issues full of vital importance to his own age, with the detachment of a mere spectator, was a heroic feat. This splendid impartiality, which set itself only to explain how events happened in this way rather than that, and how men's aspirations and ideas were formed, while refusing to pronounce any judgment upon them, and while keeping the historians' own opinions strictly in reserve, has influenced the study of history deeply. Tocqueville examined the development, and traced the progress, of democracy without letting fall a hint how deeply he feared it. The loss of a few private letters would even have left us in ignorance of his religious belief. To-day the Bishop of Oxford can make a similar boast. His readers might easily mistake him for a Radical.

This is far from being Ranke's only contribution. He supplemented the critical method where Niebuhr had left it deficient. Documents were submitted to the same questioning as traditions. Evidence was traced back to its source and testimony weighed. Yet another advance was made when, from scrupulous collation of printed texts, Ranke pressed on to the

discovery that printed books cannot suffice to reconstruct the past, and it is not science to extract history from anything less than the entire body of written evidence.

In England Macaulay had at first welcomed Ranke's discoveries with enthusiasm. He justly praised the "History of the Popes," for it was only when the Roman Catholic Church received adequate treatment that the key to the Middle Ages was found. Voigt had been the first to release the Mediæval Papacy from the dilemma of good or bad, and Milman was presently to do good work here with his "History of Latin Christianity."

Macaulay afterwards became jealous of Ranke. Certainly no one could accuse Macaulay of impartiality. Yet he is more than a brilliant writer. His "State of England in 1685" was a valuable attempt at a task which J. R. Green afterwards accomplished. On the whole, though he often seems to lean to the doctrine of Thiers, that "L'Histoire c'est le Portrait," Macaulay may be considered as one of the historians who learnt the secret of historical imagination, the imaginative reconstruction of the past, from Scott. With him may be joined a greater writer, Michelet, by far the most splendid type of his school, who succeeded also in bringing the geographical features of a country into vivid connection with the fortunes and character of its people.

In the path which Ranke had indicated, when he announced the necessity of adding the study of manuscript sources to the knowledge of books, the chief pioneer was Mignet. His monograph on the Spanish negotiations under Louis XIV. set the example of such specialisation, and led the way in a study of archives—a branch of history still rapidly extending itself year by year. Grote may be said to have received from Niebuhr an impetus rather than any definite conceptions or methods. The

dominating conception of his history was to put in a more favourable light the Athenian democracy, which had been misrepresented by the prejudice of Mitford. In this respect he was working on the same lines as Guizot, when Guizot examined the principles of the English Revolution. He was, to a certain extent, carrying on the traditions of Hallam, and the constitutional studies which dated back to Locke and Montesquieu. But he was under the guidance of larger conceptions. His standard was not framed with an eye constantly on the Whig institutions, but had reference to a universal idea of democracy. However, he had learnt something from the mistakes of the last century, and he understood by democracy, not a rigid code to be accepted or rejected, but a force operating differently in different times and places according to national conditions. He was very much under the influence of the Utilitarian philosophy and sometimes moved, rather indirectly, by the ideas of Comte.

A writer who illustrated these tendencies more conspicuously was Buckle, though his "History of Civilisation" was a failure. He had drawn much on Utilitarianism, more still on Comte's idea of humanity and human progress, with its three stages theological, metaphysical, and positive—but the most remarkable feature of his book is the aspiration after a principle of unity in man's history. A transformation had come over the historic mind. For the *Volksgeist*—the spirit of nationality—there had been substituted, under the inspiration of Hegel, the *Weltgeist*, or World Spirit. Buckle was bound by the limitations of a strictly material and positive view. But the conception of the *Weltgeist*, joining hands, as it were, at last with the newer conception of evolution, has modified all subsequent historic science, even for those who would scornfully repudiate the suggestions of any philosophic principle in history.

Macaulay's ideal was a narrative which should compete in popularity with the three-volume novel. Thiers thought that history was a form of portraiture. Kinglake, Motley, Carlyle, and Froude all aimed at portraiture, idealising or caricaturing their subjects with unwavering partiality. Prescott, the compatriot of Motley, had unfolded an impartial panorama. None of them could have exercised their fascinating art if their generation had not fallen heirs to that historic sense which is founded equally on sympathetic imagination and on the critical and comparative methods.

No one could be farther removed from this theory of history than Freeman, but Freeman was with Kinglake and Froude at least in the indifference to the metaphysical side of historical studies. To Freeman history was past politics, and politics were present history. Some of his best work was the continuation, under more favourable conditions as to material, and with an improved science, of the labours of Anglo-Saxon scholars like Sharon Turner, Kemble, and Palgrave. The idiosyncrasy which is to be noticed in him—resolve to study history on the spot, and elicit it from city walls and the features of a landscape—is repeated, in a finer perfection, in Green and Gregorovius. With Professor Freeman I must be allowed to associate—for no better reason than that they both carried light into regions which most scholars have shrunk from—the name of Burton, the author of the standard "History of Scotland."

Something like Freeman's exclusive interest in politics is discernible in the remarkable phalanx of Berlin professors—Mommsen, Droysen, Treitschke, Von Sybel, and Gneist. Mommsen is famous, first and foremost, for his "History of Republican Rome," with its continuation, the volume on the Roman provinces, and then for his editorship of the "Corpus

Inscriptionum"; Droysen wrote the history of the Macedonian Empire; Gneist is second only to Dr Stubbs as an authority on the English Constitution; but all were affected by a common idea, which harsh critics are inclined to characterise as the apotheosis of force. History seemed to them only reasonable if might were also right; if the strongest were also the best. The Romans triumphed, not through treachery, but because success was their desert. Not infrequently the Berlin school have confounded the *Weltgeist* with the *Volksgeist* in their endeavour to prove that Prussia has been so far successful, because she deserved success, and that, in the future, her deserts must inevitably meet still further success. It is a very interesting case of one aspect of the theory of evolution, together with a certain ethical view of history, uniting so as to coincide with the national idea of the beginning of the century.

The application of the principles of evolution, and the comparative method, is strikingly exemplified in Sir Henry Maine's "Ancient Law" and "Village Communities." More fruitful scientific hypotheses, and a wider field for comparison, enabled Maine to carry into the whole field of pre-historic institutions, such researches as Niebuhr had endeavoured to apply to the limited area of the institutions of pre-historic Rome. Maine's work has been widely extended or corrected by anthropologists; especially by McLennan, in his penetrating criticism of the Patriarchal system; and similar investigations are still being carried on in localised departments by scholars like Mr. Seebohm and Mr. Round.

A product, in great measure, of the ideas of evolution and the *Zeitgeist*, or Time Spirit, the apprehension of the aggregate of human energies as an organic whole, has concentrated itself, now in the social and civic life of the people, as in Green's brilliant presentation of the development of the

English people, now in the activities of the artistic sense, as in Gregorovius' study of mediæval Rome and Athens, and Addington Symonds' delineation of the Italian Renaissance, now in some other manifestation of intellectual or moral energy. Thus Professor Villari has studied the environment of typical Florentines, such as Machiavelli and Savonarola; Mr. Lecky has explored the moral altitudes and abysses of Europe from Augustus to Charlemagne, and the social, political, and moral ideas of the eighteenth century, and has attempted a kind of natural history of opinions. Mr. Morley has treated in a similar way the intellectual and social environment which prepared the French Revolution, and, in his most recent book, the ideas of the Commonwealth. And here perhaps is the most convenient occasion for noticing a very remarkable development of the Hegelian idea—its creation of the Tübingen School of Theology, which, founded by Baur, has made its influence most widely felt in the "Life of Jesus" and "Origins of Christianity" of Renan—not a disciple, but a descendant. I place his work here as an example of the tendency to look on all human activities as interdependent parts of a living whole—in other words, as parts of an organism. As Savigny had first taught the historian to see law as a natural secretion from the social instincts of the nation, so now men are regarding art and morals, and even religion, as states evolved under necessary conditions from the human consciousness. The Hegelians of Tübingen conceived the idea of the "Formation of Truth"—the truth of religion consisting in its adaptation to the existing order of ideas, and therefore in perpetual motion. Renan took this idea up, and supporting it with a completed science of documentary criticism, and illuminating it with rare literary qualities, made its fortune.

Documentary criticism has inevitably played a

very serious part in the development of history, from the time that it became the practice of the historian to go behind the printed book. Charters do not lie. The History of Early England is written in Domesday Book. What did the actors themselves allege as their motives? That is the object of search, and all the motives historians have credited to them may be swept away. Something like this is the persuasion of the English school of to-day. Pre-eminent in that school, it needs not to say, are Bishop Stubbs, who has an unrivalled knowledge of our early charters, and Dr. Gardiner, who has an unrivalled knowledge of the manuscript sources for the history of the great Rebellion. Most of the activity of to-day is engaged either in the investigation of special points in ancient institutions, as in the case of Mr. Round and Mr. Seebohm, or in the discovery of new evidence to elucidate special points of later history—the case of Mr. Firth. The publication of State papers goes on apace. But there was never the same sensation in England as was produced on the Continent by throwing open the archives of Vienna and Berlin. Our arcana had not been hermetically sealed.

Few results have been more startling to the historian of this age than the discoveries which have been made by archæological exploration. From Champollion's Egyptian discoveries in the first quarter of the century, and Layard's discoveries at Nineveh, the tide has rolled on, wider and wider. To mention a very few of our innumerable acquisitions, there are the Hittite inscriptions, there are the results of Schliemann's excavations at Mycenæ and in the Troad, there are written records of Egypt and its dependent countries, to throw back the art of writing and the first historical data into an unsuspected distance of centuries, and now there are Mr. A. J. Evans's discoveries at Knossos to show that Minos was no myth, but the founder of an actual Cretan

dynasty. Probably the writers on Egyptian and Asiatic history best known to an English public are Canon Rawlinson, Professor Sayce and Dr. Flinders Petrie.

If we limit our view of the prospects of history to this country, we shall have little difficulty in observing a strongly marked tendency. The "Dictionary of National Biography," on which most of the historians have been engaged, has set an ideal and a method before the younger men. They assert that history ought to deal only with facts. So did Ranke. But Ranke meant that the historian should stand by absolutely impartially, and let the epoch which he was studying develop itself, in all its aspects, without incurring either his moral condemnation or approval. The new school mean that the historian has no business with ideas, or motives, or tendencies; it is his business solely to inquire, Did this happen, or not happen? Did it happen this way or that? This intention to limit the historian's view to the concrete fact is naturally joined with an intense specialisation. Nothing could be further from the historian of to-day than the desire to work with the whole field of history constantly before his mind, as Ranke worked. Large views are false; the only genuine work is done in a corner. The enormous volume of material, increasing daily in geometrical proportions, seems to make specialisation an imperative necessity. Another characteristic of the moment also tends to throw extensive views into disrepute. The age has suddenly become bankrupt of ideas.

It seems as if only a philosophical mind of the calibre of Goethe's, an imagination as sturdy and as versatile as Scott's, joined to such a range of first-hand knowledge as would cost the greatest scholar a lifetime, could hope to-day to animate history not unworthily with a great conception. Yet without that hope, history would scarcely be a subject of the first interest to humanity.

VIII

TRAVEL AND EXPLORATION

BY MAJOR MARTIN HUME

NOT a column alone, but a library, would be needed to tell the story of the world's unfolding during the nineteenth century, for in no previous hundred years have so many of the earth's secrets been wrested from her. Men still in middle age were taught geography in their schooldays from maps in which the whole of the interior of Africa was represented as a blank, and the fringe of Australia alone was traced. The mirage of marvels has vanished before the torch held high by the explorer, and in our own generation almost the last retreat of mystery has been exposed to the prosaic influence of modern civilisation. The opening of Africa appeals first to the imagination, both in consequence of the vastness of the field, and because the exploration of the Dark Continent reveals traces of mighty empires long ago vanished and of civilisations dead before the birth of our chronology. Before this century commenced, scattered factories and settlements of English, Dutch, and Portuguese fringed the coasts, but all beyond was darkness. In 1788 the African Association was founded, and Mungo Park under its auspices reached the Upper Niger from the Gambia coast before the end of the eighteenth century. In 1805 the same

intrepid Scotsman again attacked the great river which he hoped to identify with the Congo, and passed the mystic Timbuctoo on his way down towards the sea. Of his forty-five European companions only three survived the seven months' tramp to the banks of the stream, and Park and the few survivors were soon afterwards done to death at Boussa, leaving the secret of the Niger outlet still unrevealed. Then all slumbered for ten years, until 1816, when two unsuccessful expeditions subsidised by the English Government attempted to meet, by respectively ascending the Congo from its mouth and descending the Niger from Boussa, believing them to be the same stream. The next forward step was Denham and Clapperton's splendid march from Tripoli through Fezzan to Lake Chad and Bornou (1822). But the explorers died without solving the Niger's secret, and it was left to their follower Lander to sail down the great stream for 800 miles of its course and emerge from one of its myriad mouths, at Brass, in the Bight of Benin (1830–32). In the meanwhile the French were busy with the same problem. In 1828 Callié made his wonderful journey from Senegal through Timbuctoo and the Western Sahara, even to the Straits of Gibraltar. Thenceforward French travellers have never ceased in the work of exploring and Gallicising the valley of the Upper Niger and its hinterland in order to connect the Senegambia region with their colony of Algeria; and the partition treaty with England now practically gives France a free hand in that region. The Germans, as usual eager for knowledge, were not idle in the same field. Barth (1850), Rohlfs (1865), and Nachtigal (1870) worked down from the north to the Chad country, Rohlfs travelling on foot from the Mediterranean to the Gulf of Guinea, and Dr. Nachtigal striking across Africa from Lake Chad to Khartoum and Egypt (1874). But a greater than

Nachtigal was already at work tearing Africa's secret from her heart. David Livingstone first travelled from Cape Town in 1840 through Bechuanaland to the first of the great inland lakes, N'gami, and explored what we now call Rhodesia and the Transvaal Colony. But between 1853 and 1856 his greater work was begun. Still pushing northward, Livingstone discovered the great Zambesi Falls, and thence travelling to the west he emerged at St. Paul de Loanda (1856). Then he retraced his steps and crossed Africa from west to east and came out at Quilimane. Between 1858 and 1861 Livingstone explored the basins of the Zambesi and the Shiré, which latter river led him to the vast reservoir of Lake Nyassa (1864). In 1866 he explored the regions to the west of Nyassa, and as high up as the great Tanganyika (1869), which Burton had previously reached (1857). Livingstone was ill, and returned to Ujiji on the east of Tanganyika, where Stanley met him in 1871. But he persisted in his task of exploring the coasts of Tanganyika and Bangawelo until May, 1873, when the sublime martyr of African exploration died in solitary prayer, beloved of all men, black and white. The problem of the Nile was being attacked at the same time. Bruce had followed the course of the Nile from Egypt as far up as Berber in 1768, and now in 1857 Burton and Speke struck inland from Zanzibar, and discovered Tanganyika and Victoria Nyanza, which latter Speke rightly guessed was the great feeder of the White Nile. In 1860 Speke again started with Grant to verify this surmise. Passing through M'Tesa's realm of Uganda, they traced the stream from Victoria Nyanza northward for a great distance, and on their way back at Gondokoro met Samuel Baker and his heroic wife, who were exploring from the opposite direction. Baker then followed the course of the Nile backward to Lake Albert Nyanza,

which he first discovered; and the veil which for centuries had covered the birth of the great river was lifted (1864). I have incidentally mentioned Stanley's search for Livingstone (1871). Five years afterwards Stanley again started, and crossed Africa from Zanzibar to the mouth of the Congo, tracing that river for the whole of its course (1876), and aiding King Leopold to carve out for himself that great African empire which has led to the partition of the whole continent among the European Powers. A more marvellous journey still was that of Cameron, who, on foot, and for a great distance alone, crossed the continent from Zanzibar to Benguela (1875), adding greatly to geographical and astronomical knowledge. Egypt, too, reached down the now ascertained course of the Nile, whilst England claimed the Nyanzas and their regions; the efforts of Lugard, Johnstone, and Rhodes forming a continuous line of British possessions from the Cape to the White Nile. Unfortunately our weak agreements with Germany have broken the line at Lake Tanganyika; but with this one interruption the Queen's flag flies from the Nile to the Cape. Thus, with France supreme in the north-west hinterland, Germany on the east of Tanganyika, Belgium on the Congo, Portugal in Angola and Zambesia, and England everywhere else where value lies, in our own century Africa has been tamed and partitioned, thanks to the intrepid explorers who have led the way.

Next in importance to the opening of Africa is the exploration and settlement of Australia. At the beginning of the century the interior was unknown, the convict settlement of Botany Bay and Port Philip alone representing civilisation. The first explorers naturally started from these points. In 1813 Philip Wentworth first crossed the Blue Mountains, and discovered the rich rolling plains of Bathurst, and in 1828 Sturt explored and opened up the fine valleys

of the Darling and Murray Rivers. In 1845 the German Leichart, who in a subsequent journey (1848) perished, made a fine journey from the extreme north point parallel with the east coast down to Brisbane; and in 1860 Burke and Wills travelled from the Gulf of Carpentaria in the north down to New South Wales. In 1862 Stuart started from Adelaide and crossed Australia in its centre or broadest part, from south to north, surveying for the telegraph line which now marks his course. The gold fever had attracted great populations to the eastern portions, which were rapidly settled; and in 1870–4 John Forrest explored the country from the west coast to Stuart's central telegraph line, Ernest Giles and Warburton in several journeys almost simultaneously mapping out the country further north from the west to the centre. Quite recently, in 1897, David Carnegie made an adventurous journey from Coolgardie Goldfields in the south of West Australia to those of Kimberley in the north, but much of the desert interior of West and Northern Australia is still imperfectly known.

In America the progress has been still more marvellously rapid. The United States only obtained possession of the vast territory west of the Mississippi in 1803 by purchase, and at once set about exploring it (1804–1807). Then the Mexican War of 1848 gave California to the States; and the 1846 treaty with England fixed the limits on the west coast to the north, and later still Alaska was acquired from Russia. The exploration of these vast territories has been effected piecemeal by pioneers, settlers, and gold seekers. In South America the progress has been slower. Until the last few years the interior of Patagonia was still virgin, but hunters, sheep farmers, and naturalists like Mr. Hudson, have now traversed and described it, whilst the surveyors of the Argentine Government, under Señor Moreno, have during the

last three years fully explored the Patagonian Andes. A similar cause has added to our knowledge of the valleys of the Orinoco down to the Amazon basin, which had remained fallow since Schombergk's survey in 1835. The valley of the Upper Amazon still continues unknown away from the banks of the river; but as steamers ply as far up as the Madeira, trade will gradually push savagery aside even here, and no mystery will remain in South America.

The exploration of Central Asia in the last fifty years has largely obeyed political impetus. Father Huc, a missionary, in 1845 made a notable journey through Thibet, but Russian officers on the one side and English agents on the other have since competed in penetrating the forbidden lands. In 1859 Valikhanoff penetrated Kashgar, in Turkestan, which has now become almost Russian. In 1870 Fedchenko explored north of the Pamirs, and Douglas Forsyth reached Yarkand, in which the Russians have now also established their influence. Western China, too, has been traversed in many journeys (1871–1888) by Prevalsky, whilst Bonvalot, alone and with Prince Henry of Orleans, has visited the Pamirs, Thibet, and Moru (1880–1890–1896). More recently, Dr. Sven Hedin, a Swede, made his really important journey (1893–97) through Chinese-Turkestan, Thibet, and Mongolia; and Mr. Savage Landor and the late Captain Wellby have penetrated Thibet.

To tell the story of a century of Polar exploration adequately would fill many volumes. At the opening of the century the problems of the North-West and North-East Passages were still unsolved, and the position of the true magnetic poles was undecided. In 1817 the Scoresbys discovered a great open sea to the north-east of Greenland, high up in the Arctic circle; and at once John Ross and Parry endeavoured to find the North-West Passage by that route, whilst Buchan and Franklin tried to reach the North Pole

(1818). Both attempts failed, but in 1819 Parry sailed again, and discovered many fine waterways—Barrow Strait, Wellington Channel, Melville Sound, &c.; and in 1821 he sailed once more with Ross, Buchan and Crozier, in search of the North-West Passage. In this he failed, as he did in a third attempt in 1824, and in another effort to arrive at the Pole in 1827, when he reached 82·45 N., the highest point yet attained. In 1829 John Ross, financed by Sheriff Booth, attempted to find the North-West Passage in a steamer, spending three winters in the Arctic regions; and on this occasion James Ross first fixed the position of the north magnetic pole (1831). In the meanwhile, Franklin was attempting to reach the Pole by land (1821 and 1825), and obtained much fresh information. Simultaneously Beechy and Richardson, in conjunction with Franklin, nearly completed the survey of the Arctic coast of America, a task which was completed by Simpson in 1837. In 1845 Franklin and Crozier sailed in the *Erebus* and *Terror* on the voyage from which they never returned. Rae (1848), McClure (1850), Belcher (1852), McClintock (1857), and others, were sent in search of Franklin; and gradually the entire loss of the expedition became known. The search expeditions resulted also in a great addition to our knowledge of the Arctic coasts and islands. McClure discovered the North-West Passage, by the frozen Melville Straits (1850), and Grinnell Land, Franz Joseph Land and North Greenland were surveyed, especially by Nares (1873–4). A great number of American Arctic expeditions followed; and Greely, in 1882, reached within 450 miles of the Pole. In 1888 Nansen started overland across Greenland, and Peary in 1892–4 crossed it still further north. In 1895 Nansen in the *Fram* wintered in the ice, and reached the highest latitude touched: 84·4 N., by drifting, and, by sledge, to 86·14 N. On the other

hemisphere, Nordenskjold, in a series of expeditions (1875–1879) had sailed around Arctic Asia and had successfully established the existence of a North-East Passage; and so far as coast surveys go, there seems little more to be done in Arctic exploration.

The Antarctic has been less fruitful of result. Cook in the last century had succeeded in pushing back the great Austral Continent that had haunted men for ages; but the American whalers and Weddell (1820–3), and Balleny (1839) traced the South Shetland Archipelago south of Cape Horn; and in 1839 the Frenchman Dumont d'Urville discovered Adélie Land and many islands in Dirk Gerritsz's Archipelago. In 1840 Sir James Ross sailed from Tasmania southward, and discovered Mount Sabine and Victoria Land, with its active volcanoes, reaching the great ice barrier in 78 S., and in January, 1842, attaining the highest Antarctic point touched up to that time, 76 S. In 1895 Borchgrevinck visited Victoria Land, and the same explorer, financed by Sir George Newnes, passed the winter of 1899–1900 on that inhospitable shore, determining, at last, the position of the south magnetic pole. A Belgian expedition passed the previous winter blocked in the ice off Graham's Land, but obtained no result of importance, nor does there seem to be much more worth knowing in that direction. Thus has the world shrunk in the century of steam, whilst civilised man has entered upon an increased inheritance.

IX

THEOLOGY

BY THE REV. ARTHUR W. HUTTON

"HAS there been theological progress in the nineteenth century?" is a question which men will answer very differently in accordance with their point of view. According to some, the science and criticism of the century have irrevocably put theology out of court; according to others there never was a time when theology in some form or other attracted more genuine and sympathetic interest than it does now. There is truth in both answers; but in what follows an attempt will be made to sketch the diverse tendencies of religious thought during the century, chiefly in relation to our own country, where the second of the above answers is the more obviously true.

Precedence is rightly given to the venerable Church of Rome. Having reached her lowest estate in Great Britain about the year 1770, she has profited thenceforward by the reaction that comes from sympathy with a great and ancient cause in decay; and men rose from the contemplation of the humbling of the Papacy by Napoleon, to a just recognition of the moral significance of Catholicism, and this feeling naturally led on to the Emancipation Act of 1829. Thenceforward the Roman Catholic Church has made slow but almost uninterrupted progress, both in the

Old World and the New, though losing from time to time the prestige due to the support of notable persons, as also, to a great extent, the unquestioning allegiance of the masses of the population in countries still nominally Catholic. But in one sense it may be said that only in the Roman Catholic Church has there been any theological progress during the century; for there only, in 1854 and again in 1870, has the reign of dogma been extended, with the concurrence of the vast majority of the faithful; though the defection of the "Old Catholics" since 1870, with such distinguished men as Dr. Döllinger among them, needs to be placed on record, despite the fact that in this country they had no following. Apart from this, the Roman Catholic Church has hardly been affected by the historical and other studies of the century. Privately her learned men may have adopted, almost unconsciously, a changed point of view towards some of the conclusions of scientific and literary criticism; but the case of Dr. Mivart has recently shown that Catholicism claims to remain uninfluenced by modern thought. Among the names by which her history in this country during the century will be distinguished are those of Wiseman, Newman, Manning, Ward, Faber, and Dalgairns, five of the six being converts from the Church of England, to which we next proceed.

Although the spiritual deadness of the Established Church when the century opened has been exaggerated by some writers, there is no doubt as to the fact. The Evangelicals had great and good men, such as Charles Simeon, among them, but their influence was by no means paramount; and Paley's "Natural Theology," 1800, "an apology for the existence of a God," was more representative of ordinary Anglican theology, while the Church stood firm on the unintelligent conservatism of the masses. But Clapham (Henry Thornton) and Clapton (Joshua Watson)

were shortly to infuse into the Anglican body a doctrine of faith by no means inimical to the good works of such men as William Wilberforce, and this was to last on, long after the coming, in 1833, of the influence, partly supplementary and partly antagonistic, of the Oxford Movement, which has since that date almost completely changed the character of the Church of England. On this subject so much is continually appearing in the public Press that no more than a bare reference to the familiar facts can here be necessary. Originating as a defensive movement against political dangers, its prime agents, Keble, Newman, and Pusey, had before them the question, "On what principles will our Church have to depend in case of disestablishment?" And the answer they gave was, "On such theological considerations, especially concerning ecclesiastical organisation and power, as differentiate it, we believe, from Nonconformists at home and from Protestants abroad." Ritual usages, which have latterly made the movement at once popular and unpopular, played little part in the original scheme; but their *raison d'être* lies almost wholly in the theological ideas insisted on by the original Tractarians, of whom the late Dean Church was an excellent example. Other theological ideas that have deeply affected the Church of England, as well as all other Reformed Churches, will be referred to below.

The Free Churches of this country have during the century experienced a great awakening, partly on Evangelical and partly on critical lines, both tending to minimise the importance of the points whereon they differ, and so leading to a desire for union. These Churches have been fruitful in preachers rather than in professed theologians; though at this moment Dr. Fairbairn, of Oxford, holds an eminent position among the latter, and many other names, such as that of Dr. Dale, of Birmingham, might be given, of

learned and influential writers on divinity. But of all the non-episcopal Churches of Great Britain it is true to say that, in the latter half of the century especially, their fount of theological inspiration has been in Germany. The philosophy of Kant and of Hegel has profoundly influenced the minds of their religious teachers, especially in Scotland; while the names of Rothe, Martensen, and Luthardt may be mentioned among writers on Christian dogmatics who have done much to mould our contemporary Protestant theology. One name, however, from among our own people, that of James Martineau, must on no account be omitted, since his life was co-extensive with the century, even more than Newman's, while the influence of his frank and fearless, yet always gentle and spiritual, teaching will long be felt outside as well as inside his own not very broad communion. His disciple, Mr. Stopford Brooke, should also be named, though he by rights belongs rather to the school of Dean Stanley, within the Established Church. Of the great Nonconformist preachers above referred to, Charles Spurgeon was the most influential, though others less conspicuous have been more in harmony with the current of liberal theology that has distinguished the century. And to note here other great preachers, the Anglican Church has had Frederick Robertson, of Brighton, and Canon Liddon, of St. Paul's; while Manning and (on rare occasions) Newman kept up their reputations for pulpit eloquence after they had crossed the border.

Generally speaking, dogmatic theology during the nineteenth century has been marked by two distinct currents, both calculated to defeat the disintegrating influence of the purely intellectual ideas of the Revolution—the one being a recurrence to the principle of authority, and the other an appeal to the facts of spiritual experience. The former tends ultimately to Rome, as the most consistent exponent of the

principle in question; the latter falls in with the genius of the Reformed Churches, and forms, indeed, the ground of their present vitality. Though it has always constituted the life of "the blessed company of all faithful people," it is only during this century that it has disentangled itself from the crude literalism and the naïve beliefs which characterised the Reformers of the sixteenth century no less than the ancient Church. Schleiermacher's "Der Christliche Glaube" (1821) was the beginning of this new dogmatic theology, which is devoted to the investigation of the Christian faith as based on religious experience. His ideas have been developed with much learning by Pfleiderer; and Dr. Percy Gardner's "Exploratio Evangelica," published in 1899, is the fullest exposition of the method in our language. More or less on these lines has been the teaching of Frederick Robertson, Dr. Arnold, Kingsley, Maurice, Stanley, Phillips Brooks, and Jowett; while the same appeal to experience, though on a lower educational level, is to be found in General Booth's "Salvation Army," of which any sketch of theology in the nineteenth century will have to take some account.

The spread of knowledge, scientific and literary, has throughout the century tended to make it less and less easy for any Church to stand securely on the credulity of the unconverted but submissive masses; but religious experience steps in where the appeal to authority deservedly fails, and it affects the cultivated no less than the ignorant. And herein lies the explanation of the notable fact that a century beginning with Paleyism, *i.e.*, with the alleged sufficiency of external evidence as the ground of faith, should end with theology being held in higher honour, although meanwhile Lyell, Darwin, Tyndall, Huxley, and others, have entirely revolutionised anthropological science, and Baur, Strauss, Renan, and others, have (less completely, it is true) revolu-

tionised our conceptions of the function of the Bible as the basis of faith. The process of reconstruction and of restatement is in our own country in a less advanced stage than it is in Germany, where, in the religious world, the influence of Ritschl and of Harnack is supreme, but of its progress at home there can be no doubt. Seeley's "Ecce Homo!" turned the thoughts of many in this direction as early as the year 1865. Nor should a reference be omitted to the inspiring genius of Tolstoy, who, with whatever exaggerations, has helped to spiritualise and refine current conceptions of the ethical value of Christian doctrine. Our poets too — Coleridge, Tennyson, and Browning—have contributed not a little to the work; and Richard Wagner's "Parsifal" holds an honourable place in the great Christian reaction; but the permanence and the increased regard for theology must mainly be ascribed to the fact that, throughout this eager, analytic, free-spoken century the testimony of the soul's experience has never failed.

X

PHILOSOPHY

BY W. F. ALEXANDER

THE progress of philosophy is not marked by stages of discovery, but consists in the absorption of its earlier problems into problems profounder and more complex. But its vigour at a given period must depend not only on an inherited stock of problems, called solutions by a former age, but also on a favourable environment, on the mood of the *Zeitgeist*. During the first decades of the century, amid the whirl and rush of manufacturing development, English philosophy was, perhaps naturally, Utilitarian, and was inspired by a generous passion for progress rather than by a disinterested concern for thought. Profundity was not much in demand; and Kant was popularly supposed to be "misty." In an age of rapidly-growing science Hume was still unanswered; and, after all, no two things are more antipathetic than science and scepticism. On the other hand, after what must be called the failure of Coleridge, it was left to poetry to adumbrate, and to some extent to popularise, Transcendentalism. Hamilton, great man as he was, apparently had not the patience to read Kant through, and his own philosophy, if rigorous in method, was provincial in its scope. What strikes us now about Hamilton and his fol-

lowers is that philosophy presented itself to them as a number of separate problems, falling apart like atoms in the void. Primary qualities belong to the object, secondary to the subject—each problem, each aspect of existence, is relative to the other, yet no unifying principle is anywhere to be found. Thus Hamilton speaks of the Absolute rather as if it were a thing among other things. It naturally followed—as was made so clear by Mansel's facile exposition of Agnosticism from the pulpit of St. Mary's in Oxford, that since the Absolute cannot enter into relations, it cannot be known. That the Absolute might be conceived as a process including cognition in itself was as yet unthought of. J. S. Mill, in his summary of the Benthamite doctrines, touched the supreme problems of philosophy discursively and with something of the impatience of the practical reformer. Thus, his canons of Induction are models of lucidity, but they chiefly subserve purposes outside philosophy, and it is only the scientist who can gauge their usefulness. But the supreme problems are always with us, and starting from Locke's *tabula rasa* Mill's system soon encountered the familiar difficulty of the inadequacy of any series of experiences to the universal. "Laws" insist on remaining mere probabilities; the "happiness" of the individual never necessarily squares with the general welfare; causation, the mainspring of knowledge, is only a name for sequence. Nietzsche's saying that England vulgarised European thought is not without its point. Mill would probably have rejected Lotze's profound suggestion that it is only "the supposition of a universal inner connection of all reality" that enables us to argue from past to future; but this supposition is really implicit in his own system. His work on the mechanical and chemical methods (or conceptions of Being) is valuable in itself, and also—in so far as the latter implies the permeation of the

individual by the universal—as evincing his tendency to escape from Individualism.

What gave unity to modern philosophy was the idea of Evolution, conceived at first in terms of pure thought, rather than of experience. For Schelling the self-evolution of the "Idea" results in the polarity of matter and spirit; the problem is to define the process which produces and unifies these opposites. Thus the starting-point of Hegel is pure, or mere, Being, the point at which there is no separation between thought and existence. Then commences the self-evolution of Spirit, or Reason, by dint of the dialectical process in which the inadequacy of thought to itself creates a spontaneous movement from one stage or "category" to another. Thus, "matter," substance, cause, are abstract ideas expressing the Absolute, but in a form that thought necessarily transcends. The result, which includes in itself the process of its own genesis is the universal as individual; man, embodying reason, is not merely a "particular" man, but an individual; as a citizen, or a thinker, he carries the burden of the whole. The logical "Idea" utters itself in Space as Nature, in Time as History: man reaches freedom when he realises the Absolute Spirit is himself. No doubt Hegel's reasoning is shot through and through with imagination: in its way his Logic is as aërial a flight as the "Paradiso" itself. To the poet in him God is Reason; in strict argument he tends to the conclusion that Reason is God, or simply that the world is rational. It may be argued that the "dialectical movement" is merely subjective, or that, as Lotze says, the "categories" are only our way of describing those relations or harmonies of things that cannot be otherwise apprehended; or, again, that the immanent act we call evolution is cognisable by, but not identical with, Mind. It still remains true that with Hegel thought arrived at the age of self-criticism;

that his intensely keen analysis of its forms—"form" being of course as essential to thought as to matter—had results which, however applied, must be vital to our comprehension of development. With the next philosophy of evolution, now approached from the side of sensuous experience, we find ourselves, however, in a very different world. The magnificent independence of Mr. Herbert Spencer's work deserves the most profound respect, however much, as a typical English thinker and the representative of an eagerly scientific age, he may be held to have the defects of his qualities. In strong contrast to Hegel's, Mr. Spencer's philosophy regards evolution simply as a process happening in the material or objective world, and one admitting of interpretation by a single persistent formula, for which all forms of being are reducible to manifestations, first of matter and motion, and ultimately of force. One would never willingly forget the fine passage in which Mr. Spencer—agreeing in this with Clifford, if not perhaps displaying quite the same keenness of analysis—has shown the implicit equivalence of Mind and Matter. But, for all that, we are justified in calling his world "material," since for him it is the analogy of the so-called "material" by which all existence is to be explained. Things in general—including the soul—"behave," to use Lotze's phrase, as though they were material: the term "organism" is applied to the protozoa and to man alike, the "ego" becomes an "aggregate" of desires; and Mind, for which after all the world exists, becomes an incident, perhaps not a vital one. We have the identity of existence, without full recognition of "difference." Mr. Spencer combines an immense grasp of fact with a singular monotony of conception, and thus affords comparatively little of the rare but intense pleasure of philosophy. Great as his system was, it provoked revolt by its metaphysical narrowness, its reliance on the

mechanical conceptions of causation and organism, those "philisterhaft einklemmende Gedanken," which seem to ignore so much of the spiritual experience of the race. The doctrine of the Unknowable, chiefly based on the rather wooden metaphysics of Hamilton and Mansel, applies no doubt to the ultimate reality of Force as much as to the existence of God, but philosophy is perhaps more intimately concerned with the latter question. Broadly speaking, this theory of human limitation was a re-utterance of the last word of the eighteenth century; and since Kant was now beginning, thanks to the labours of Dr. Edward Caird and others, to be understood in England, thought inevitably went back to the great legacy of the Critique of Practical Reason. Schopenhauer's theory that Reality is Will, not pure or mere Reason, no doubt also gave impetus to a new current of speculation, which turned to ethics as the vital sphere of philosophy. And since natural evolution appeared to lead to the materialisation of the soul, as well as to the confounding of the "categories," the first effort of the new philosophy was to impose a barrier, to insist on "difference." Hence the pivotal idea of T. H. Green is that man is a "self-distinguishing subject"—Mind is never identical with sensation nor derivable from it; on the contrary, without the relation-giving action of mind, the objective world we know would not exist, or would at best be a blur of sensations, as it may perhaps be to an amœba. The "relation-giving" function is no more individual than language; yet every mind that has experience is so far an organ, a new centre, of the creative intelligence. Morality thus becomes, not the expression only, but the immanent presence of the Divine, the ultimate reality which slowly realises itself it the evolution of history. Green's is a Hegelian, but also a very English theory, the expression of an intense and perhaps a narrow Puritanism. Unlike Hegel, Green

seems to revert to the mediæval view of Nature as the enemy of spirit; and, in his treatment of it, the "self-distinguishing Ego" becomes really a barrier to knowledge. That conception belongs to Lotze as much as to any one, and it is much to be regretted that the influence of that great and sane thinker, the nearest of all the moderns to Aristotle, alike in patient acceptance of fact and in lofty imagination, has not been more felt in this, or for the matter of that, in his own country. Lotze's tentative yet progressive methods, the large hospitality of his mind, his very sane conviction that the efforts of mankind towards metaphysics have not been mere waste, make the study of his works at least an invaluable discipline. English thinkers, however, have of late been almost wholly engrossed in Ethics. As the advocate of soul against materialism, Green found in Martineau an ally whose eloquence was the fitting expression of an eminently platonic mind, and of a great zeal for righteousness. Martineau, however, may be regarded as in the first instance a great preacher, an impression which his extremely figurative manner of thought tends to confirm. On the other hand, the late Professor Sidgwick and Mr. Leslie Stephen have done much to develop, or perhaps one may say to rationalise, the ideas of utilitarianism. With Sidgwick's Universal Hedonism, the gulf between the rival theories—between the happiness a man should seek and the satisfaction found in obedience to law—is almost closed. That too pliable term "happiness" seems, however, destined to be absorbed in the larger idea of self-realisation. But Ethics, after all, are only a branch of philosophy, and must in a sense be governed by the conceptions of metaphysics. It is perhaps too soon to attempt an estimate of the strikingly original work in which Mr. Bradley has revitalised much of what seem now the most valuable results of Hegel and Lotze. Strangely enough, the

nineteenth century closes with a philosophy of the Absolute in possession of the field, and that this should be the most essentially English theory of the kind ever produced, certainly suggests that neither the irony nor the fecundity of Thought is as yet exhausted.

XI

ECONOMICS

BY J. A. HOBSON

THE rich, stimulative and inconclusive character of Adam Smith's "Wealth of Nations" made this book the most serviceable starting-point for economic thinking in the nineteenth century. The blending of science and art, deductive and historical methods, industrialism, and political humanitarianism gave rise to several divergent paths of investigation, each in some sense appertaining to political economy.

Certain thinkers, interested primarily in the social generalisations suggested by the "Wealth of Nations," broadened the basis and systematised the treatment, until they had identified the study with the science and art of "politics" in the large meaning of that term. Auguste Comte built the current economics into his larger structure of sociology, in which all the forces of society were studied in their inter-relations as belonging to a single social unity, and the fourth volume of the "Philosophie Positive" marks the new dynamic conception of social growth which was to be enriched later by the riper doctrine of evolution. Robert Owen in England, with less erudition but with equal zeal, laboured to establish upon scientific premises, drawn largely from the economics of Adam Smith, the art of

human society and social progress, "The New Moral World" ranking as the representative expression of a school of thought and politics devoted to wide schemes of educational, industrial and political reform, which for a short time seemed likely to crush the narrower, more specialistic political economy. Though the trend of academic thought making for specialism and those exact methods which abhor "sentiment" rescued political economy from the danger of being merged in sociology, the larger science of Comte and Owen has not lacked important followers either in Great Britain or the Continent. The contribution of Maurice, Kingsley, and the Christian Socialists in general, to industrial and political reform has rested upon some conception, however imperfect, of the unity of social science, while John Ruskin, by referring wealth, cost, utility and other economic terms to a human standard, really reverts to the broad utilitarian standpoint of Owen. Herbert Spencer has followed Comte in including analysis of the economic functions in his general study of "The Principles of Sociology."

Upon the Continent, Germany and Austria and Italy have been foremost in taking the broader view of economic science. Among these, Roseher, Hildebrand and Knies, chief founders of the historical school of political economy in Germany, deserve mention, though among later writers the chief representative of the sociological school, Schäffle, is less distinctively historical in his treatment. His "Bau und Leben des Socialen Körpus" still ranks as the most important attempt to furnish the larger science of sociology. The Belgian Laveleye, the Italian Enrico Ferri, the Swiss Stein represent a recent development of political economy on lines of broad sociology. In England, no one has sought to build scientifically on the great foundation laid by Spencer, though in the United States a little professorial knot, *e.g.*, Lester

Ward, Giddings, Patten, Ely, &c., are taking the broader road.

The distinctive trend of economic thought in England has been the narrowing of economic theory so as to yield a science of industry which shall deal with the production, distribution, and exchange of marketable wealth and of its productive forces upon the existing basis of economic society, conducted and measured by money. The formation of this science in the earlier decades was dominated in the main by the aims and interests of certain classes of commercial men, chiefly manufacturers and financiers, who selected and gave emphasis to doctrines which suited their business or political purposes. Ricardo, the banker, in his "Principles of Political Economy and Taxation," laid the foundation of a compact system of dogmas which held the public mind for the next forty years with an authority which, though seriously questioned, was never really shaken. This powerful and original thinker, taking Smith's teaching of labour as the source of value, of a "natural wage," and of rent as a residuum, and fortified by the theory of population which the Rev. T. R. Malthus had developed in the second edition of his famous "Essay on the Principles of Population," welded the current doctrine into a compact and fairly consistent body of thought, with social and political implications consonant with the interests of the new industrial classes. The growing vogue of the study of political economy was due primarily to the pressure of the Free Trade movement. The expediency of division of labour among nations, involving for its basic principle free exchange, had won the attention of statesmen and business men to the "Wealth of Nations." Ricardo, with convincing brevity, expounded the advantages of foreign trade and drove the lesson home. But his most important contribution was his theories of Rent and of Value with their implications.

Rent is his starting-point. It is the price paid for use of "the original and indestructible powers of the soil," and the differences of rent for different lands are due to differences of these powers. The tendency of rent is to rise with population, such increase of rent going into the pockets of landlords, whose interests are directly opposed to those of the other classes. As growth of population requires food to be raised by greater expenditure of labour on inferior soil, money wages will rise and profits tend to fall; but, while the capitalist loses, the labourer does not gain, for his higher money wage will buy him no more food than before, because any tendency to higher real wages will be checked by an increased growth of labouring population. So profits fall, wages remain stable at a "natural" price, rent only rises. This is what normally happens under competition, though Ricardo makes some allowances for friction and the modifying effects of changes in the arts of agriculture and manufacture. This "science" made strongly for "free trade," which would give cheap food and raw materials, enabling manufacturers to keep down "costs" of production, and would hit the selfish conservatism of the landed interest; it proved the futility of trade-unionism and of all its endeavours to raise by organisation or legislation the economic wage of the workers, while the tendency of profits to a minimum seemed to answer any questions as to the power of capitalists to keep more than their share. In the hands of James Mill, J. R. M'Culloch, Nassau Senior, and R. Jones, new rigour was imparted to the Ricardian principles, and the doctrine of the wage-fund was invented, finding its clearest though most fallacious expression in the writings of Senior, who draws important conclusions from the self-evident proposition that if you divide the total quantity of wages paid (his meaning of "wage-fund") by the number of recipients you will

get the average wage. J. S. Mill in his "Principles" (1848) stretched the Ricardian economics as far and even farther than they would go. He contributes little new substance to the main theory, unless his teaching upon the growth of capital and the impossibility of over-production, the weakest part of his "Principles," be so accounted. What he really achieved was the popularisation of the science by his lucid and eloquent exposition, and by instilling into it humane sentiments and liberal speculations which did not easily fit in with the rigour of his formal economics. The new humanitarian spirit was, in fact, destined to break the bottle which contained it. J. S. Mill's zeal for the progress of the working classes, his interest in co-operation, and his perception that not only the monopoly of land, but the terms upon which labour bargained with capital were fundamental defects of our economic structures requiring radical reforms in the direction of Socialism, in fact, sapped the foundations of the very doctrines he was expounding.

J. E. Cairnes and J. S. Jevons seriously shook the fabric left by J. S. Mill, the former by exposing in detail many of its weaknesses, the latter by setting up a theory of value which was revolutionary in its effect upon the science, and by establishing the importance of more exact methods of statistics in handling economic subjects. The theory that all value, and consequently prices depend upon forces operating through demand, and not upon "costs" or expenses of production, has led to an interminable squabble among academic economists, and has been made the basis of new fundamental theories by German and Austrian economists. Until recently the deductive economies of the chief Continental thinkers had been chiefly drawn from Smith, Ricardo, and Mill. Say and Bastiat had won French thinkers largely to the Free Trade teaching which they ex-

pounded, and though in Germany independent thinkers like Hermann and Von Thünen questioned some of the accepted doctrines, and a national "protective" economics (*e.g.*, List) sprang up in the Universities, still Smithianismus was in the main the accepted view. In more recent years the revolt of Jevons against the "cost" theory of value has been widely followed, both on the Continent and in America, and Anton Menger Wieser and Böhm Bawerk have written works which apply both to production and distribution the Jevonian principles and methods with important results.

Professor Marshall, whose "Principles of Economics" is the recognised English text-book to-day, while adhering in the main to the English traditional economics of Ricardo and Mill, adopts a middle position upon the essential theory of value, and applies with much skill and success the mathematical calculus to express the relations between cost and utility in the practical problems of distribution. His most important contribution towards economic theory is in the extension of the Ricardian notion of rent, so as to cover various elements in income, which he distinguishes as "quasi-rents."

The drift of economic study in Great Britain has been of late in two directions, first an attempt to secure increased exactitude for economics by the application of mathematical methods, emphasising the monetary aspects, and making of it a financial science. Cournot in France, Jevons in England, Von Thünen in Germany were pioneers in this mathematical treatment, to the development of which Professor Edgeworth, the Rev. P. H. Wicksteed, and others have recently devoted themselves. Specialist studies in statistics of wages, prices, taxation, &c., pursued by many competent economists in England, Germany and America, are subsidiary to this mathematical political economy.

The other marked tendency is towards industrial and financial history, in which Professors Thorold Rogers and Cunningham are among the best known writers in this country. Much careful historical investigation has been done by such men as Brentano, Schmoller, Wagner in Germany, and by the Le Play school in France, their chief material being drawn from England. The number of workers in these fields of research, as in other branches of political economy, is far greater in Germany, Italy, France, and the United States than in this country, where political economy as a science speaks with far less authority than it did in the middle of the century. Bimetallism and certain aspects of the relations between Capital and Labour, have drawn away English economists from the attempt to carry further the unification of the science which Ricardo, J. S. Mill, and Jevons sought to accomplish.

This brief sketch would be incomplete without some reference to the working-class or reform political economy, which claims to rest upon a scientific basis. The so-called "orthodox" economics was accompanied in its rise and growth, both in this country and on the Continent, by an output of hostile doctrine directed chiefly against its conservative or quietist tendencies, partly critical, partly constructive in character, and mostly "socialistic" in import. Without counting the definitely practical propaganda of S. Simon, Fourier and Owen, &c., a number of assaults were made upon the dogmatic individualism of the Ricardians by men of very competent ability, who not merely denounced, but often skilfully exposed the fundamental flaws in our economic structure, laying down the central doctrine of the right of labour to the product of labour. Among these the best known in his day was William Thompson, the influence of whose life and writings entitle him to be regarded as chief of the English Socialist school.

With him may be associated John Gray, who is described as "the pioneer of modern militant, aggressive Socialism," Thomas Hodgkin and J. F. Bray, all writers and agitators in the Owenist and Chartist schools. They did not, however, succeed in establishing any body of working-class political economy in this country. The "scientific Socialism" of to-day is distinctively German in origin, owing its critical and constructive character chiefly to Rodbertus and Karl Marx, and its political economy is contained in the "Socialist Bible," "Das Capital." Among the thinkers of the Social Democratic movement the criticism of the capitalistic system contained in this work, and the theory of exploitation of labour by means of "surplus value," is generally accepted as final, though the position of Marx as an authority is less absolute than was the case ten years ago. In this country Marxism has been propagated through the writings of Messrs. Hyndman and Belfort Bax. It is significant that the economists both of the Land Nationalisation and the Socialist schools base their special teaching upon the analysis of Ricardo; the former developing the anti-social implications of the Law of Rent, the other hardening his theory of a "natural wage" into an "Iron Law." In the Continental countries, in the United States, and even in this country, there are many professors and students of political economy who, while repudiating the rigour of the Marxist doctrine, are in deep essential agreement with the criticism of the competitive industrial system based upon restricted ownership of the necessary land, capital, and education.

XII

EDUCATION

BY FRANCIS STORR

VAST as has been the progress of this century in pure and applied science, in mechanical inventions, in municipal government and social well-being, even more extensive and more revolutionary is the advance in national education. In 1800 there was in England no such thing as State education in any shape or form ; such public instruction as there was depended wholly on ancient endowments, with which the State did not intermeddle, or on hand-to-mouth charity. In 1900, as Hazell's Annual truly remarks, "the educational system of the United Kingdom is a remarkably varied and complex system," so varied and complex that the six double-columned pages there devoted to it will leave the intelligent foreigner in a hopeless maze. The history of this expansion has been written at length by several distinguished publicists, among whom, as the latest and best, may be mentioned Mr. Graham Balfour. All I can here attempt is to give in brief what to an onlooker, whose business it has been for the last quarter of the century to chronicle and criticise educational movements, seem the main tendencies of the century, the leading lines of natural evolution. The progress may, indeed, be fitly described as a survival of the fittest, for in

England the action of the Government has followed, always tardily and often reluctantly, in the wake of public opinion. No English statesman, like Wilhelm von Humboldt in Germany or Guizot in France, has stamped his image and superscription on national education. Our English Ministers of Education, like Roman emperors, have watched the gladiators in the arena—Churchmen and Dissenters, school boards and county councils, headmasters and crammers—and contented themselves with crowning the victor. So the latest of them, Sir John Gorst, confessed, or rather boasted, in 1899, at Liverpool. Parliament at their instance has voted subsidies, in some cases all too generously, but it has founded no school or training school; royal charters have been granted to universities, but no single chair has been endowed.

For primary education at the beginning of the century there was no provision save charity schools and Sunday schools. Charity schools, founded mostly in the previous century, taught a modicum of reading and writing, but the one class book was the Church catechism, and the one object contemplated by the founders to make the children of the poor know their proper station in life. The only good point about them was that they were open to girls. The Sunday schools, started some twenty years before by Robert Raikes, had spread and multiplied, and it is worth noting that at first they included secular instruction. The first advance in popular education is connected with the names of Bell and Lancaster, men of no importance as educators, but famous as the originators of the two rival bodies, the British and Foreign School Society (1814) and the National Society (1817), the representatives respectively of undenominationalism and the Church of England, through which the State and schools were first brought into contact. It was in 1833 that, on the motion of Lord Althorpe, a sum

of £20,000 was voted "for the purposes of education." The money was to be applied to the erection of school-houses in Great Britain, and its administration was committed by the Treasury to the two societies. Whitebread's Bill of 1807 (a remarkable anticipation of the Act of 1870), which passed the Commons and was rejected by the Lords, and Brougham's abortive Bill of 1820, the outcome of the Select Committee on the education of the lower orders, of which Lord Brougham was chairman, deserve a passing notice.

From the year 1839 we may date the conception of the Education Department (formally constituted in 1856). In that year, at the instance of Lord John Russell and Lord Lansdowne, the control of the Parliamentary grant was taken from the Treasury and vested in the Educational Committee of the Privy Council, that somewhat shadowy body familiar to us as "My Lords." The first secretary to the Committee was Dr. J. Philips Kay (afterwards Sir James Kay-Shuttleworth), a man, as Matthew Arnold testifies, whose faith in popular education was heroic. To Kay we owe inspection of schools, though at first the hampering condition was attached that inspectors of Church schools (nine-tenths of the whole number) must be clerics approved by the Archbishop. Kay, too, could he have had his way, would have given us State normal schools, but on this point the Bishops refused any compromise, and Kay had to content himself with founding, in conjunction with his friend Mr. Tufnell, the Battersea Training College, the progenitor of all our subsidised denominational colleges. A more doubtful boon that we also owe to Kay is the pupil-teacher system, an improvement doubtless on the monitorial system that it superseded, but after all a makeshift which will not survive another century, and is only to be excused by *rerum novitas.*

The ill-omened Code of 1861 endorsed the principle

of "payment by results," and it has taken schoolmasters a quarter of a century to rid themselves of the yoke. The whole discredit for this Code has fallen, not quite fairly, on Mr. Lowe, and the dilemma whereby he defended it—"if the system is not efficient it will be economical, and if it is not economical it will certainly be efficient"—has become a by-word among educationalists. In justice to Lord Sherbrooke it should be remembered that he was merely carrying to their logical conclusions the recommendations of the Newcastle Commission, and that his drastic code, though it stunted the growth of good seed, at least killed off the tares that then abounded.

Mr. W. E. Forster's Bill of 1870 marks the grand climacteric of the century. By it the State first recognised the duty laid upon it of bringing elementary education within the reach of every child in the kingdom, and disallowed the claim of the Established Church to impose its creed on all children who attended Church schools. Like all English legislation, the Bill was a compromise, and the remaining years of the century have been occupied in the endeavour to carry out the underlying principles of the Bill without violating the concordat to which Churchmen and Dissenters then set their seal. Thus the universal provision of schools on the part of the State involves a corresponding duty on the part of parents to send their children to school; but Mr. Forster did not venture to carry compulsion beyond the stage of local option, and it was not till 1880 that compulsory attendance was made universal. Again, it is clear that attendance cannot be enforced so long as fees are charged, and in the Forster Bill there was a provision for the remission of fees in poor districts, but it is only within the last decade that free schools for the people have become the law of the land.

Board schools were founded professedly to supple-

ment, not to supplant, Voluntary schools, and Mr. Forster rashly opined that the Board School rate would never exceed threepence in the pound. When these schools not only multiplied beyond all anticipation, but also demanded better and better-paid teachers, the rate rose by leaps and bounds, and there was a bitter outcry on the part of Voluntaryists against the "intolerable strain" of a competition which they regarded as a breach of faith. They might have remembered a prophecy of their most distinguished spokesman which was still wide of the mark. Sir James Shuttleworth held that parents and managers should, and eventually would, bear the whole cost of education, as they then bore two-thirds of it. The Doles Bill of 1897 was a sop to Cerberus, but the end of the quarrel is not yet. What that end will be I cannot pretend to prophesy, but I can see no escape from this dilemma—if schools are privately managed the managers must bear a sensible part of the cost; if they are run at the public expense, the public must have a voice in the management.

To sum up this section, we have nationalised our elementary schools, we have extended and liberalised the curriculum, we have to a large extent undenominationalised them—for fear of misconstruction I avoid the word "secularised." It remains for us to raise the age of attendance even to the minimum agreed upon at the Berlin Conference, to enforce attendance, and lastly to provide more rungs for the Jacob's ladder that Huxley saw in vision.

In secondary education there is less achievment to chronicle, and the huge tomes of Blue Books, Reports, and other documents which record experiments, essays, and partial successes, cannot be compressed into a nutshell. As far as legislation is concerned, secondary education was a blank till the Public Schools Inquiry Commission of 1861, which was

followed up by the more comprehensive Endowed Schools Commission of 1864. These paved the way for the Public Schools Act of 1868 and the Endowed Schools Act of 1869. The outcome of these Acts was to sweep away many crying abuses that had flourished under the "pious founder's" shade, to place endowed schools, as far as finance was concerned, under public supervision, and to enlarge the course of studies, which often, as in the case of Eton, had not been modified for three centuries. The change was great and, as far as it went, salutary, yet till 1899 nothing had been done to remove the grave indictment of the Taunton Commission Report: "Not a single payment from the Central Government to the support of a secondary school, not a single certificate of capacity for teaching given by public authority. In any of these senses there is no public school and no public education for the middle and upper classes. The State might give test, stimulus, advice, dignity; it withholds them all." In 1894, at the instance of Mr. Arthur Acland, the Royal Commission, over which Mr. James Bryce presided, was appointed, and reported at the end of 1895. That ladies for the first time sat on the Commission is a noticeable sign of the times. Part of its recommendations have been carried out by the Board of Education Act, which came into force on April 1st of 1900. By this Act we have for the first time, like all other civilised nations, a genuine Minister of Education, not a subordinate Secretary responsible only for primary schools. We have a Consultative Committee—a tardy and tentative recognition of the principle that teachers should have a voice, if not a vote, in all that concerns their profession. Lastly, we have in near prospect what we teachers have been asking for the last twenty years, a register of teachers, and this will necessitate what is equally important, a register of schools. The Act is a blank cheque, or

rather an unlimited letter of credit, which has up to now been drawn upon for units intead of millions. Moreover, the more thorny part of the Bryce Report, that dealing with local authorities, has yet to be tackled by the Legislature. Matthew Arnold's dilemma is still unsolved : " Our secondary education is a chaos ; unless, therefore, we organise the technical school within the sphere of our primary instruction, which is not desirable, we have no means of organising it at all."

To revert from measures to men, among educational reformers the name of Thomas Arnold stands first. In his brief reign at Rugby (1828–42) he changed, as Dr. Hawkins had predicted of him, the face of education throughout the public schools of England ; more, however, by the force of his moral worth and personal character than in persuance of any pedagogic system. The same may be said of Thring, of Uppingham, who first preached and practised democratic equality in schools—the right of each pupil to an equal share of the master's time and attention. Third in the list of headmasters I should be inclined to place Bishop Cotton, who at Marlborough proved the possibility of creating a great public school at less than half the cost to the scholars of Harrow or Eton. These three, it will be observed, were all clerics, and till recent years a lay headmaster was an anomaly. In the list of the Headmasters' Conference published in 1900 more than one-third are laymen, and it is safe to prophesy that in the year 2000 a clerical headmaster will be regarded as a freak or a survival.

Again to summarise, we have humanised our public schools—" tunding " and the horrors of " Long Chamber " have disappeared with the pillory and the stocks. We have modernised the curriculum ; Latin and Greek are still supreme, but Mathematics is admitted as a junior partner, and on Modern Sides

science and modern languages are seriously pursued. Through the stimulus of external examinations and open scholarships work in the highest form has been made really efficient. By help of reconstituted grammar schools and proprietary schools such as Cheltenham and Haileybury the supply has greatly increased. We have still to make teaching a profession, differentiated from the clerical profession, and with proper qualification for admission like the Law and Medicine. We have still by means of inspection to see that the boy of average abilities who can never win a scholarship is taught something more than cricket and football. We have still to provide secondary education at a reasonable cost for the great mass of the lower middle classes.

In higher education the expansion has been greater and the reforms deeper and more solid than in secondary. In 1800 England had but two universities, both confined almost exclusively to members of the Established Church, and both still steeped in the "port and prejudice" of Gibbon's day. At Oxford there were no proper examinations worthy the name, and at Cambridge only one, in mathematics. Scholarships and fellowships depended wholly on birth or favour; and the latter were restricted to clerical celibates. In the first decade Oxford "Greats" appear; in the second the classical Tripos at Cambridge. In the fifties we have University Commissions, bringing in their wake financial and administrative reforms, and a partial abolition of tests and subscriptions—the total abolition had to wait till 1871. The same decade saw the foundation of Owen's College, Manchester, the forerunner of a long series of local university colleges, two of which have in their turn developed into universities. Before these, under the auspices of Mr. Grote, University College, London, had received its charter as the University of London. A noble protest at starting

against the clerical exclusiveness of Oxford and Cambridge, it soon degenerated into an Imperial Examining Board; and it was only during the year 1900 that it entered on the true functions of a university.

At the subsequent development of universities I can only glance. In theory, at least, they now take all knowledge for their province, and divide their favours equally between the old and the new learning. By extension lectures they have essayed to bring higher studies within the reach of working men, and in the North they have to some extent succeeded. By examining boards and syndicates they have tested and partly regulated the work of schools—a much-needed stimulus and correction in times of ignorance; but not, in my opinion, the proper permanent function of a university. Much has been done—more still remains to do. In comparison with German universities the cost of maintenance at Oxford or Cambridge is extravagant; the scramble for scholars among the different colleges is almost indecent; and in the advance of research we are still to seek.

Of the rise of professional institutions, unknown in the last century—the College of Preceptors, the National Union of Teachers (now a power in the land), the Headmasters' Conference, our educational House of Lords, and the Teachers' Guild when the Three Estates combine—I have said nothing. I have passed over Brougham's Mechanics' Institutes and Mr. Quintin Hogg's Polytechnic, which has superseded them, the City and Guilds' Institutes, and the numberless other technical schools.

One sentence in conclusion must suffice for what, after all, is the most significant feature of the century, marking, as it does, a radical social change, the transition (to put it briefly) from Jane Austen and Mrs. Hannah More to George Eliot and Mrs.

Humphry Ward—I mean the renascence of girls' education. We may trace the well-head to F. D. Maurice and Queen's College, where Miss Buss and Miss Beale learned those sound principles which they carried out in the North London School and at Cheltenham. The next stage is the admission by tentative instalment of girls to the Local Examinations, and in time to the Triposes. Next comes the establishment of the Girls' Public Day School Company, with which Mrs. W. Grey, whose name lives in the Maria Grey Training College, and her sister, Mrs. Shirreff, are associated. The last musculine fort, degrees for women at the older universities, cannot hold out much longer.

The outgoing century has given us universal free education. We must look to the incoming century to raise the general level, to make all schools a public concern, and to train all teachers.

XIII

CHEMISTRY

BY PROFESSOR W. A. TILDEN

IT is nearly forty years since the late Professor Adolf Wurtz produced his "History of Chemical Theory," the opening sentence of which caused a sensation in the chemical world: "Chemistry is a French science. It was founded by Lavoisier, of immortal memory." Lavoisier was certainly one of the brighest intellects of a brilliant period, but had he escaped the guillotine he would, we may hope, have acknowledged the debt which he owed to the earlier experimenters, Black, Sheele, Priestley, Cavendish, upon whose discoveries his theoretical system was founded. At the beginning of the century much positive knowledge had been gained as to the composition of air and water, the minerals of the earth, and the materials of the organic world. But it was chiefly qualitative, and some time had yet to elapse before the quantity was considered as important as the nature of the elements entering into a compound.

If it were justifiable to attempt to appropriate the credit of creating a new branch of science to one nation or to one person, it might be said that if the new chemistry at the beginning of the nineteenth century was French, at the end it would be in nearly the same sense English, for all modern chemical ideas are based on the "Atomic Theory" (1807) of John

Dalton, while the great fundamental principle known as the "Conservation of Energy" owes its final establishment (1842) to James Prescott Joule and the quantitative connection between electricity and chemical action is embodied in Faraday's laws of electrolysis (1834).

In 1807 Dalton published the first part of his "Chemical Philosophy," in which the doctrine of atoms, borrowed from ancient Greek philosophy, was revived in a new form and erected on a firm basis of fact. From the idea that a compound such as water, for example, is formed by the joining together of atoms of one kind with atoms of another kind, and that in all the varied transformations of matter no particle is either created or destroyed, have arisen all the complex theories of inter-atomic action which are now matters of everyday thought. For if we consider atoms at all it is obvious that they must occupy relative positions in space, and this gives us notions as to structure, and as to symmetrical and unsymmetrical groupings, which form the subject of modern "stereo-chemistry." The idea that the arrangement of atoms in space can be traced by the scientific use of the imagination is as well founded as any other theory in physical science. A hypothesis is always justified when it not only explains facts but leads to discovery, and this is true of the doctrine which we owe in the first instance to the genius of Pasteur, and in the second to the brilliant discoveries of Van't Hoff and Le Bel. It is less than two years since the top-stone was added to this theory by the discovery that it is not only compounds of carbon which are endowed with the peculiar action on polarised light and the peculiarities of crystalline form, which are explained by the new theory, but that nitrogen, sulphur, and even metals like tin can display the same phenomena. This important discovery we owe to an English chemist, Mr. William Jackson Pope.

Chemistry, like other branches of science, has necessarily advanced simultaneously along several lines, each of which while lending help to the others tends to become more and more specialised and distinct. This is particularly true of the division known as "organic chemistry." At the beginning of the century carbon had indeed been recognised as the essential element of organic life, but no practicable means were known of determining the amount of this element or of the hydrogen, nitrogen, and oxygen which might be associated with it in such compounds. Moreover it was supposed that all such things as sugar, starch, vegetable acids, and the constituents of flesh were produced and could be produced only under the influence of "vital force."

We now know that all definite compounds of carbon can be built up by artificial laboratory processes from the dead elements, carbon and the rest, and as a result of the employment of synthetical methods many compounds have been formed which have supplied to the physician new remedies and to the world at large new dyes, new fabrics, and new perfumes. It is impossible to enumerate even the names of the chief workers in this field, but the name of Liebig can never be forgotten, because he showed the way to analyse organic compounds, and, with his countryman Wöhler, gave a working theory of their constitution.

One of the most remarkable industries of modern times, that of coal-tar colours, though now chiefly developed in Germany, originated in England in the laboratory of the Royal College of Chemistry, then in Oxford Street. Dr. W. H. Perkin, the discoverer of the "mauve" of forty years ago, is still among the most eminent and respected of living chemists. The colours themselves are to the scientific chemist interesting for the incentive they have provided to the pursuit of research into the constitution of matter,

and the relations between chemical composition and external properties, which has led to important advances in other directions.

Going back once more to 1800 we may recall the fact that in this year the decomposition of acidulated water by the electric current was for the first time observed by Nicholson and Carlisle.

In the Bakerian Lecture to the Royal Society in 1807 Sir Humphry Davy describes how "a small piece of pure potash which had been exposed for a few seconds to the atmosphere so as to give conducting power to the surface was placed upon an insulated disc of platina connected with the negative side" of his battery, and "a platina wire communicating with the positive side was brought into contact with the upper surface of the alkali," and how the potash fused, and there was a violent effervescence, while small metallic globules resembling quicksilver made their appearance. Soda gave rise to similar phenomena, and these metallic bases of the alkalis were named potassium and sodium. Davy could scarcely have foreseen the day when his process would be arranged to give not tiny globules only, but tons of the metal. Similarly the production of caustic soda and chlorine from salt, the reduction of aluminium and phosphorus, and other things, would have been impossible but for the discoveries of Oersted and Faraday in the former half of the century.

From the time of Davy and Berzelius onward successive attempts have been made to account for the connection between electricity and chemical action. Davy and Faraday expressed the clear conviction that the combination of atoms is due to the existence of positive and negative charges of electricity resident upon them, much as the sticking together of two pith balls is brought about when they are oppositely charged. But, while there is much to attract in this simple notion, there are many difficul-

ties which stand in the way of the unreserved acceptance of the hypothesis that all chemical combination is due to charges of electricity. Among the most famous contributions to the theory of electrolysis is the doctrine of ionic dissociation which we owe to Professor Arrhenius, of Stockholm. It cannot here be explained or criticised, but there can be no doubt that the connection between chemical and electrical actions has been rendered more intelligible by its use.

Since the beginning of the century the number of the elements known to the chemist has received many additions. Of these must be mentioned the metals which from 1860 onwards have been successively discovered by means of the spectroscope, the use of which was not previously known ; and, most wonderful and unexpected of all, the strange gases, helium argon, and their companions, which, since 1894, have been discovered in the earth's atmosphere by Lord Rayleigh and Professor William Ramsay.

It is only within the last thirty years that the elements, of which nearly eighty are known at the present time, have been reduced from the condition of a mere miscellaneous collection of curiosities to an orderly system by the recognition of a definite relation subsisting between their properties and their atomic weights. The so-called "Periodic Law" was first formulated by John Newlands, an English chemist. It has now been established as a well recognised principle through the labours of Professor Lothar Meyer, and especially of Professor Mendelejeff. These relations, which indicate a close connection among the elements, have led to much speculation as to their cause, and to the revival of the idea of the essential unity of all matter. The name of Sir William Crookes is prominent among those who have adopted this view ; while Sir Norman Lockyer, from his own researches, has been led to the

conclusion that the process of evolution which leads to the formation of common terrestrial matter may be watched by the spectroscope in the radiation from the sun and stars.

Another result of modern work is the liquefaction of all the known gases. The use of these agents, and especially of liquid hydrogen, the production of which in quantity we owe in the first instance to Professor Dewar, leads to the expectation that it may be possible to reach that, at present, hypothetical degree of cold, the absolute zero of temperature.

XIV

MEDICINE

BY DR. H. J. CAMPBELL

MANY and notable were the advances made in medical science during the eighteenth century, and many and notable were the men who made them, such as Boerhaave, Hoffman, John Hunter, Willan, Cullen, Radcliffe, and Sloane, and yet, when compared with the nineteenth century, the increase in knowledge and the improvement in practice were comparatively small. At the beginning of the nineteenth century the mortality of the large towns was tremendously high, sanitation was utterly neglected; owing partly to the existence of the window tax, houses were dark and ill-ventilated; in hospitals gangrene was rife, nursing, as at present understood, was unknown, cleanliness was conspicuous by its absence, and in many cases the general conditions were such as to foster rather than to cure disease. Vaccination was only in its infancy, and the average annual death-rate from smallpox was 3,000 per million. Nearly one-tenth of all the deaths in London within the Bills of Mortality were from this cause alone, and the majority of the victims were young. In addition, it is to be remembered that even amongst those who recovered, many were rendered sickly, deformed,

blind or deaf. As Macaulay says: "The smallpox was always present, filling the churchyards with corpses, tormenting with constant fears all whom it had not yet stricken, leaving on those whose lives it spared the traces of its hideous power, turning the babe into a changeling at which its mother shuddered, and making the eyes and cheeks of the betrothed maiden objects of horror to the lover." The treatment of the insane was barbarous to a degree; patients were exhibited as shows, loaded with chains, and often beaten with many stripes, sometimes half-starved, and always neglected. Various means were employed in the endeavour to startle them back into sanity, or, as it was then thought, to exorcise the demons that were supposed to possess them; sometimes they were placed in revolving swings which could be caused to rotate at the rate of one hundred turns per minute, sometimes they were immersed in baths so constructed that the bottoms came out and plunged the occupants into the so-called "bath of surprise" below, and at others they were suddenly lowered from high towers into subterranean caverns. Ordinary patients too had much to suffer at the hands of the doctor; not only were they bled, poulticed, and blistered to a degree which would soon put an end to their less hardy sons, but they were forced to take enormous quantities of powerful drugs, the actions of which were but too little understood. In fact, medical treatment then really consisted "in putting drugs about which doctors knew little into bodies about which they knew less." The most generally accepted theory of disease was that of Rasori, who divided patients into two classes, the naturally strong and the naturally weak, but considered that the class to which any given patient belonged could only be determined experimentally; if bleeding and a lowering treatment generally did good, the patient belonged to the strong or sthenic

variety, if harm, he belonged to the weak or asthenic. Further, the knowledge of the functions performed by the various organs of the body was very small; thus a writer in the early years of this century lamented that though the liver is the largest organ of the body no one knew its purpose, nor the use of the bile secreted by it.

The nineteenth century has been described as the age of scientific medicine, and the name is not inapt, for throughout its course the tendency has been to avoid theories, and to deal only with observed facts. About the year 1800 doctors began to cast aside the air of mystery and seclusion in which their fathers delighted and to welcome the help of workers in adjacent fields of science whenever and wherever such assistance could aid and further medical research. The new era was fitly inaugurated by a brilliant French surgeon, M. F. X. Bichat, who, although he died at the age of thirty, had succeeded in founding the science of histology or minute anatomy. A few years later (1808) Corvisart published a French translation of a pamphlet by Auenbrugger upon chest diseases, in which the author pointed out for the first time that abnormalities in the structures beneath the chest wall could be detected by the note produced, when the chest was percussed. Eight years later Laennec invented the stethoscope, and so revived and immensely improved a method of diagnosis originally used by Hippocrates. With the introduction of this instrument a new era of exact observations in clinical medicine may be said to have commenced. New facts upon chest diseases were quickly brought to light, the researches of Gaspard Bayle and Louis being specially noteworthy. During the early years of the century, too, Edward Jenner's views upon vaccination were slowly gaining adherents, with the result that smallpox gradually became less common. Further, the passing of the Apothecaries

Act in 1815 had a most beneficial influence upon the education of English medical men. Prior to this date there was no compulsory form of training at all, and hence many of those who professed to be doctors were nothing but illiterate and uneducated quacks. The beginning of the century was also memorable in the annals of surgery, for there then flourished in England Astley Cooper, Charles Bell, Colles, and Abernethy. During this period, too, the biologists were, by their researches into the ultimate structure of plants and animals, paving the way for the evolution of the germ theory of disease. In 1825 Beaumont, an American surgeon, made his famous experiments upon digestion, the results of which were later on confirmed and amplified by Eberlé and Blondlot. In 1838 the office of Registrar-General was established in England, and, under Dr. Farr's able management, became a power for good. As the middle of the century was approached the number of active workers steadily increased. Moreover, the general public were beginning to realise that in medicine, prevention is better than cure. The Government with the help of Dr. Parkes and under the direction of Sir John Simon, were slowly being brought to acknowledge that they also had duties to perform in connection with the health of the community at large, and that, in the words of Dr. Parkes, "nothing is so costly in all ways as disease, and nothing is so remunerative as the outlay which augments health, and in doing so augments the amount and value of the work done."

During this period, too, much good work was being done in physiology. Magendie discovered many new facts about the nervous system ; Claude Bernard, who has been described as the founder of modern physiology, threw much light upon the functions of the digestive glands ; Johannes Müller worked at the special senses ; Ludwig, amongst many other

researches, specially devoted himself to the elucidation of problems connected with the circulation of the blood; Helmholz invented the ophthalmoscope; Du Bois Reymond studied the effects of electrical stimulation of muscle and nerve; and Brücke made observations of far-reaching importance upon digestion and sensation. In England, Bowman made investigations into the structure of muscle, and Goodsir discovered many new facts in anatomy. The clinical side of medicine was also by no means neglected; for such men as Trousseau in France, and Sir William Watson in England, not only made many valuable observations upon the nature and course of disease, but also, in their brilliant lectures made known the newer discoveries to their students and to the profession at large. About this time lived Graves, a Dublin physician, who, though now chiefly remembered by his having been the first to describe the disease which bears his name, yet was himself anxious that his tombstone should bear the inscription, "He fed fevers." Three physicians at Guy's Hospital, Hodgkin, Bright and Addison, the discoverers respectively of Hodgkin's disease, Bright's disease, and Addison's disease, and Bennett, who first observed the characteristics of the malady known as leucocythæmia, rendered British medicine famous throughout Europe. Perhaps, however, the most far-reaching of all the notable discoveries of the middle of the century was, that it was possible, by means of certain drugs, to annul the pain of surgical operations without endangering the life of the patient. Up to this time (1844), in the words of a medical man who had himself been operated upon, "a patient preparing for an operation was like a condemned criminal preparing for execution. He counted the days till the appointed day came. He counted the hours of that day till the appointed hour came." Sir Humphry Davy had in the year 1800 suggested the

use of nitrous oxide gas for the purpose of inducing anæsthesia, and different experimenters had, from time to time, made use of this or ether in isolated cases, but it was not until 1846 that two Americans, Wells and Morton, had the courage to use ether in a series of operations, and to publish the results of their experience. In the following year Sir James Simpson, of Edinburgh, made experiments upon himself and his friends with various substances, the result being that he finally decided in favour of chloroform, which had been discovered by Soubeiran and Liebig in 1832, and the employment of which as an anæsthetic had been suggested by a chemist named Waldie. Simpson had a hard fight before he could overcome the prejudices of both doctors and laymen against the use of anæsthetics ; some feared the danger, some thought that the pain of the operation aided recovery, and many considered that it was an unnatural flying in the face of Providence.

Whilst referring to Sir James Simpson, it may be mentioned that the reforms which have taken place in the management, construction, and ventilation of hospitals during the latter half of the century were to a large extent initiated by his enthusiastic and untiring labours. Other workers in this field were Dr. Parkes, Florence Nightingale, and Mrs. Wardroper. Medical education, too, was being improved in all respects ; the passing of the Anatomy Act in 1832 put an end to the trade of the body-snatchers, and made crimes like those of Burke and Hare, who committed murder that they might obtain bodies to sell to the medical schools, an impossibility. The crusade against insanitary conditions which resulted in the passage of the Public Health Acts may be said to have started with the Government inquiry into the health of towns and of the country generally, undertaken by Chadwick, Southwood Smith, Neil

Arnott, Sutherland, Guy, Toynbee, and others, and the work thus initiated was ably carried out by the medical officer of the Privy Council, Sir John Simon, and by Dr. Parkes. During the latter half of the century science has indeed advanced with rapid steps, but amongst the many discoveries that have been made in connection with things medical, none can compare in importance with those referring to the relationship between disease and the micro-organisms known as bacteria. Stimulated by Pasteur's successful work upon silk-worms' disease, Rayer and Davaine were encouraged to resume their researches upon wool-sorters' disease, and to carry them to a successful issue. Further, Pasteur's researches upon fermentation also threw so much light upon the life-histories of the organisms, that it became evident, that these minute plants had much to do with disease and disease processes. To substantiate this, however, it was necessary to prove that the theory of spontaneous generation was absolutely untenable; and this was done by the labours and experiments of Dusch, Schwann, Schröder, Schulz, Hoffmann, Chevreul, Pasteur, Tyndall, Huxley, Cohn, and others. There soon followed, aided by the improvements that had taken place in microscopes, and especially by the employment of aniline dyes as staining re-agents, the identification of different bacteria as the causative agents in various diseases. In 1882 Koch discovered that consumption was due to the presence of the tubercle bacillus in the lungs, Klebs and Löffler, during 1882–4, proved the connection between diphtheria and a specific bacillus; Fraenkel found pneumococci in the expectoration of patients suffering from pneumonia; Eberth showed that a special bacillus was always present in the intestine of those suffering from typhoid fever; Koch traced the causal connection between the comma bacillus and cholera; Pfeiffer discovered the influenza bacillus, and Kitisato

and Yersin the specific bacillus of plague. Many other diseases, both of man and other animals, have been shown to be due to these minute plants, but it has also now been conclusively demonstrated that some maladies are the result of the growth of almost equally minute animals ; thus Laveran, Celli, Marchiafava, Manson, and others have shown that malaria is due to the growth of the malaria parasite, and Ross has recently proved that the mosquito is necessary for the conveyance of this parasite from man to man, as it is in this insect that one stage of its life history must be passed if it is to undergo full development. The natural corollary of the discovery of the association between disease and bacteria has been that investigators have looked for some agent which will serve to neutralise the baneful effects of the micro-organisms, with the result that for various microbial diseases specific antitoxins have been produced. In some cases, as in diphtheria, plague, tetanus, and hydrophobia a large measure of success has been obtained. Great, however, as has been the benefit derived from the discernment of the causal relationship between bacteria and these diseases, of yet wider and fuller import was Lister's application of the results of Pasteur's work upon fermentation to the treatment of wounds. The brilliant conception which resulted in the introduction of antiseptics indeed revolutionised surgical method and procedure, and enabled the surgeon to walk boldly where in pre-antiseptic days he would have feared to tread. It may be truly said that the introduction of anæsthetics, together with the discovery of how to keep wounds bacteriologically clean, has not only robbed surgery of half its terrors, but has saved an incalculable number of human lives and spared much human suffering. During recent years great progress has been made in every department of medicine. For instance, in nerve disease the labours of Hitzig,

Flourens, Hughlings Jackson, Golz, Gowers, Ferrier, and many others, have resulted in the mapping out of the functions of the different parts of the brain and spinal cord. Jenner, Russel Reynolds, Wilks, Clarke, Gerhardt, Erb, Brouardel, and Roux have added much to our knowledge of the symptoms and course of general diseases; Rokitansky, Rindfleisch, Cohnheim, Billroth, and Virchow have carried on the work so ably commenced by Bichat; Graefe, Bowman, Pagenstecher and many others have brought eye surgery to the high position it now holds; whilst in the hands of many skilful operators as Liston, Syme, Lister, Paget, and Spencer Wells, general surgery has become a fine art. Thus, if we compare the close of the nineteenth century with its commencement, we find in the present day a steadily diminishing annual mortality, small-pox becoming an almost rare disease in countries where vaccination is moderately well carried out, and an almost unknown one where primary and secondary vaccination are efficiently enforced; other infectious diseases tending to diminish in intensity under the influence of the provision of isolation hospitals and compulsory notification; epidemics being controlled, as in the recent case of plague at Glasgow, by the energetic adoption of thorough isolation and disinfection; consumption often being arrested owing to the rational treatment now adopted, pure water, and, to a certain extent, pure air, being supplied to rich and poor; well nursed, comfortable and efficient hospitals in every large town, and cottage hospitals in most small towns, well-administered Poor-law infirmaries, lunatic asylums almost palatial in their appointments, lunatics treated with kindness and humanity, and medical education in a high state of efficiency. Much still remains to be done before medicine can in the fullest measure minister to suffering humanity, but at least we may truly feel that great and notable improvements have taken

place, and that the foundations have been laid for the magnificent superstructure which the twentieth century with its greater opportunities will, it is to be hoped, raise upon them.

XV

NATURAL SCIENCE

BY EDWARD CLODD

THE eighteenth century passed on to the nineteenth, with no small accumulations of its own, the rich legacy bequeathed it by the seventeenth century. To name only a few items, this included Kepler's three laws of the movements of the planets; Newton's theory of gravitation; Harvey's discovery of the circulation of the blood, and his formula of development; "every living thing comes from an egg" (*omne vivum ex ovo*); and, in mechanics, the microscope and telescope, the latter instrument confirming, in the hands of Galileo, the Copernican theory of the universe.

To these followed, when the eighteenth century opened, Boerhaave's experiments proving that all living things are built up of the same materials; Hunter's demonstration of the likeness of structure of animals; and Hutton's investigations proving that past and present changes in the crust of the globe are due to the same causes. The later years of that century were made memorable by Herschel's discovery of Uranus, for no new planet had been added to the mystic seven since prehistoric times, and by Galvani and Volta's researches in electricity, while, as the threshold of the nineteenth century was

crossed, Cuvier's genius restored the form of some extinct animals, and Laplace, acting upon hints thrown out by Kant fifty years earlier, published his theory of the origin of suns and their systems from nebulous matter. Thus was every branch of science —physics, chemistry, astronomy, geology, and biology —bringing in material for a theory of the fundamental unity and identity of phenomena; a theory whose demonstration is the crowning triumph of the nineteenth century.

The present sketch must be limited to a summary of discoveries in the domain of biology, with such reference to complementary discoveries in the other sciences as may be necessary. Towards the close of the eighteenth century Linnæus had completed his great scheme of classification of animals and plants, but, for some years to come, observations continued to be restricted to the external features of organisms. The microscope, however, changed all this. It supplied the means of examining the internal structure of living things, and hence opened the way to inquiry into their origin and life-history. Study of anatomy invited comparison of structures and of the several corresponding organs in divers plants and animals, and of the functions discharged by those organs; hence the rise of the comparative method, with its demonstration of relations between living things. Goethe has an honoured pre-eminence in the formulation of a theory of metamorphosis of plants, that is, of the modification of their stems and leaves into the several parts adapted for the work which they have to do. For this doctrine of transformation gave impetus to search after proofs of a fundamental unity in the individual organism which was afterwards extended to the species, and, finally, to the totality of living things. Important results rewarded the inquiry. Schleiden discovered that the cell is the unit of plant life; Schwann, a pupil of Johannes

Müller, the founder of the doctrine of comparative physiology, proved that the same applied to animals. Every living thing springs from a cell. The lowest animals are one-celled, or, sometimes, a loosely-connected cluster of cells; all other animals are built up of a number of cells which form tissues whence the several organs are developed. These higher animals are the result, at least in the more complex life-forms, of the blending of the sperm-cell of the male with the germ-cell of the female (both of which are visible only under the higher powers of the best microscopes), giving rise to a fertilised egg, whence is developed an individual inheriting the character of its parents. Great is the mystery of heredity, stamping, by means of infinitesimal particles, the bodily and mental traits of ancestors on the third, or even later, generations. But, not to dwell on this amazing problem, the discovery of the cell as the fundamental structure of living things raised the question, "Of what material is the cell composed?" That question was answered a few years after Schwann's discovery, by Von Mohl, who showed that each cell is filled with a viscous, granular-looking substance, called protoplasm, which, in Huxley's well-known phrase, is "the physical basis of life." This stuff, which contains the four elements, carbon, hydrogen, oxygen, and nitrogen, in very complex union (Haeckel accords the primary activity to carbon), may exist naked for a time, but as a general rule it secretes at once a firm, continuous coat, and, so to speak, to borrow Anton Kerner's words, "builds itself a little chamber wherein to live." Thus far as to unity of origin and identity of material, each of which fell into line with an earlier discovery, adjudged by Agassiz as "the greatest in the natural science of modern times." This came about through an examination of the embryos of animals by Von Baer, who showed that creatures so unlike one another in their

adult stage as fishes, birds, dogs, apes, and men resemble one another so closely in the earlier stages of their development that it is impossible to say to what class they belong. The explanation, speaking broadly, is that the embryo, as it develops, epitomises the series of changes through which its ancestral forms passed in their evolution from simple to complex organisms; and the nearer that animals resemble one another in the adult stage, the longer and more closely do their embryos resemble one another. At an early stage the human embryo has gill-like slits on each side of the neck like a fish; these give place to a membrane like that which supersedes gills in the development of birds and reptiles; the heart is at first a pulsating chamber like that in worms; the backbone is prolonged into a movable tail, and, three months before birth, the body is covered with hair except on the palms and soles. Von Baer, as founder of the science of comparative embryology, went behind the embryonic to the primary processes of cell-cleavage, and the advance of the theory of evolution from a special to a general doctrine is largely his work, Mr. Spencer finding in Von Baer's Law of Development contributory evidence supporting his own thesis of progress from simplicity to complexity, as applied to the Cosmos, in the "Doctrine of Evolution." In unconscious contribution to the conception of fundamental relationship between living things which the knowledge of cell-material, cell-changes, and embryos engendered, three naturalists, Cuvier, St. Hilaire, and Lamarck were working shoulder to shoulder in Paris during the early years of the century. While all were busy in the study of fossils Lamarck began an investigation of the lower animals, which resulted in a book on the "Organisation of Living Bodies," wherein he suggested that the various species had not been separately created, but had been developed

by sundry causes, operating through long ages, from a few simple forms. To throw doubt on the universally accepted belief in special creation was a perilous step in those days of the long-reaching secular arm (Buffon hinted his scepticism in covert phrases); but, the doubt once expressed, a number of facts telling against the orthodox view came into unwonted significance. As for the fossils, the Noachian deluge explained them; and although Cuvier identified a fossil skeleton claimed to be that of a child drowned in the Flood as that of a salamander, even he held to a belief in successive catastrophes followed by fresh creative acts. His mantle fell upon Owen, who accepted the Cuvierian creed of "archetypes," but whose researches made so evident the unbroken connection between certain past and present life-forms that, as Huxley once said, "if evolution had not already been an accepted theory, the palæontologists would have been forced to invent it." He, with Agassiz, Marsh, von Zittel, and others, had ingathered a mass of evidence in proof of the order and succession of life, and of the descent of existing animals, as, *e.g.*, the horse, the camel, and the hippopotamus, along well-marked ancestral lines, while the vast multitude of fossil plants brought their "cloud of witnesses." Stimulus to every branch of inquiry was given by "Lyell's Principles of Geology," the publication of which suggested the question, "If natural causation is competent to account for the not-living part of our globe, why should it not account for the living part?" Cumulative as were the proofs, adduced by biologist and palæontologist, discrediting the belief in special creation, it held the field in the absence of a theory commending itself as adducing a sufficing cause, or causes, of the origin of the myriad species of plants and animals. Until that theory was formulated, even Huxley, well nigh despairing of solution of the problem, tells us that he was

"disposed to turn aside from an interminable and apparently fruitless discussion to labour in the fertile fields of ascertainable fact."

The theory which, in essentials, satisfied him and others as indicating a cause competent to produce new species, was formulated independently by Charles Darwin and Alfred Russell Wallace. "How exceedingly stupid not to have thought of that," was Huxley's remark when "mastering the central idea." "Natural selection," as the theory is conveniently named, is based upon the fact that every living thing multiplies its kind at so rapid a rate that if all the offspring came to maturity there would, within a measurable time, be no standing-room, still less food, for all. The result is a struggle for life, in which the weaker go to the wall. The qualities by which the stronger overcame are transmitted to their offspring, and, moreover, as each individual varies from every other, the favourable variations become helpful in the struggle, and are likewise transmitted by the victors. The result, in time, is the origin of new species. If the theory of "descent with modification" be true of any one living thing, it is true of every living thing, hence its extension to man himself; physically, from an ape-like ancestry, and psychically, since, in Huxley's words, "comparative psychology confirms the position in relation to the rest of the animal world assigned to man by comparative anatomy." Moreover, some years before Darwin's theory was published, there had been unearthed from the ancient river-valleys of Northern France some rudely-chipped tools and weapons pointing to man's great antiquity and to his state as one of savagery. These witnesses, at first looked upon askance, were now welcomed as confirming the application of the theory of development to man, and the more so as like evidence of his primitive condition came from every quarter of the habitable globe.

Our chronicle of the advance of knowledge by sure and steady tread to a goal of unity has thus far been limited to the organic. But while the question of the origin of species awaited its answer, a series of discoveries in the realm of the inorganic prepared the way for the acceptance of an all-embracing doctrine of development. At the beginning of the century there seemed little probability that our knowledge of the heavenly bodies would be extended to their physical constitution. There was a new departure in the discovery of minor planets, of which above 400 are now known to exist; midway through the century Adams and Leverrier added Neptune to the number of the great planets, and Sir John Herschel completed the star-gauging work of his father, whose theory that the matter which he could not resolve into stars was "a shining fluid, of a nature totally unknown to us," fell into line with Laplace's nebular hypothesis, and marked the then existing limits of human observation. But before he died the key was found which was ultimately to unlock the long-hidden mystery of the nature of the "shining fluid," and of much else besides. One hundred and thirty years after Newton had broken a sunray on a prism and shown that light is made up of differently coloured rays, Wollaston, using a thin slit to admit the ray, noticed that it was crossed by seven dark lines, which were increased to nearly six hundred by Frauenhofer when he repeated the experiment. He made some shrewd guesses as to their significance, but it was not till the year when Darwin published the "Origin of Species" (a suggestive coincidence) that the riddle was solved by Kirchhoff. The details of the solution cannot be given here; it must suffice to say that the lines, which are now counted in their thousands, the spectrum of iron alone numbering above two thousand, reveal the secret of the chemical con-

stitution of the sun. Iron, carbon, calcium, sodium, and more than thirty other elements are known to be present in his atmosphere. Kirchhoff's discovery was followed by Sir William Huggins's analysis of the light from stars and nebulæ, which proved that the former, broadly speaking, are made of the same materials as the sun, himself one of their myriad number, and that the latter are gaseous, the vagrant comets having a spectrum which is a compound of carbon and hydrogen. Sir William Huggins also discovered that a minute displacement of the lines gave a key to the direction of the movements of the stars in space, while their colours indicate whether they are in the stages of youth, maturity or decay. The marvellous revelations of the spectroscope are supplemented by those of the camera, notably since the invention of gelatine dry plates, whereby exposure can be indefinitely prolonged, and stars whose existence lies beyond the light-gathering power of the finest telescope recorded "in a scripture that cannot be broken" on the celestial chart.

The genius and industry of men athirst for knowledge have brought the infinitely vast and the infinitely minute within human purview, revealing life-cell, sun, and star, as made of like stuff, and as stirred by like activities. Matter, everywhere the same, yet ever changing its state and relations, remains indestructible; to it nothing can be added; from it nothing taken away. The agencies of its ceaseless flux, whereby alone we are made conscious of its presence, these also are indestructible; they vary in their modes of motion, and affect in divers ways the thing which they move, yet their essence is in their unity. Dalton's and Avogadro's laws of the behaviour of atoms; the grand generalisations of Helmholtz and others concerning the conservation of energy and the correlation of the forces; these have exercised the deepest influence on all speculation

and research. But the ultimate nature of the phenomena which affect our sensations remains an unsolved, perchance may ever remain an insoluble, problem, leaving play for the exercise of man's sense of wonder and of mystery the loss of which would be the atrophy of the soul.

XVI

APPLIED SCIENCE

BY WILLIAM A. PRICE

THE masterpieces of engineering of our own generation are so numerous and famous, and in their scale of size so much in advance of older works, that one realises with difficulty that the end of the last century was a period of engineering activity at least as important as the end of this. The change in the industrial condition of England in the period between the accession of George II. and the Regency was certainly not less than between the accession of Queen Victoria and the present time. At the time when Smeaton and Brindley began to lay the foundations of English engineering there were no railways, canals, artificial harbours, or machinery. Public roads were cross-country tracks, and inland navigation was tedious, and depended upon flood water. The persistence of the same names in the country registers is evidence of the small extent to which people were able to travel. At the end of the century this was being rapidly changed. Canals were being constructed all over the kingdom, and the attention of all classes of the community was directed to the importance of means of transport and to the state of the public highways. Acts for making turnpike roads were being passed every year to an extent that is hardly credible and

every parish was compelled to improve its ways. The whole agricultural system of the country was being reformed by the passage of the parish enclosure Acts, and scientific cultivation was becoming possible by the abolition of a system older than the Roman occupation and the introduction from France of improved methods. Smeaton and Telford had improved the wind and water mills, and the increased value of the water rights made the care of rivers and watercourses of practical importance. The construction of canals had involved the use of tunnels, bridges, aqueducts, and earthworks of sizes previously unknown. Within twenty years of the close of the last century, Watt had perfected his steam-engine, and in the Albion Mills Rennie had established the first complete steam-driven factory of iron machinery. Hargreaves with the jenny, and Arkwright with water twist spinning, had completely revolutionised the art of preparing yarn for weaving, and so led the way to the establishment of the factory system and self-acting machinery. Crompton had invented the spinning mule, and Cartwright the power loom, brought into use in 1807. Peel had produced calico printing machinery, and Watt had invented chemical bleaching. Bramah had invented the hydraulic press. Boulton in his factory in Soho was making intricate machinery of many kinds besides Watt's engines, and had completely equipped the Mint with coining tools driven by power. Iron was being used for bridges. Watt and Golbourne had begun the improvement of the Clyde, and steam power was being applied to dredging by Grimshaw and Bentham. Maudslay had just started his own works, where he made the famous block-making machinery for Portsmouth Dockyard, to the designs of the elder Brunel, and developed the modern engineers' screw-cutting lathe. The value of the railway, though not of the locomotive, was fairly recognised. In 1801 the country was fully embarked

on the industrial course which has since governed its political history. The principal lines upon which we have moved since then are in the perfection of manufacturing process, and the provision of rapid communication. The two are closely connected, since the possibility of moving men and goods readily makes specialised manufacture possible, while the demand for communication for large numbers of people, and for the transport of merchandise, makes the railways and steamers remunerative. A short review of engineering progress may be conveniently arranged on these lines.

Among the accomplished facts of the century four stand out more prominently than the others: The railway, the steamship, steel, and electricity; and among the great inventors of the world no one would refuse a place to Richard Trevithick, the inventor of the locomotive, and of the high-pressure steam-engine. His first high-pressure engine for colliery pumping was erected in 1800; his first steam road car ran in 1801; his first railway locomotive in 1803. The real foundation, however, of the railway system is due to the extraordinary practical ability of George Stephenson. His Hetton colliery line was opened in 1822; his locomotive works at Newcastle were founded in 1823; the Stockton and Darlington line was opened in 1825; and on October 6, 1829, began the Rainhill trial to decide whether the locomotive should be adopted for the new Manchester and Liverpool Railway. The *Rocket* ran twelve miles in fifty-three minutes, was awarded the prize offered by the directors, and established the locomotive engine as a practical success. On the day of the opening of the railway the train, which carried the dead body of Mr. Huskisson, reached a speed of thirty-five miles an hour. The railway mania followed, and there are now 22,000 miles of railway in the United Kingdom, and 330,000,000 train miles are run per year. The

first year of the new century is likely to see the commencement of Behr's mono-rail system between Liverpool and Manchester to run eighty-five miles an hour, with a capacity for double that speed. The extension of the public highways was being actively carried on till the middle of the century, and for these and for the railways bridges and tunnels were required greatly in advance of anything built since the Roman aqueducts. The first iron bridge was built at Coalbrookdale in 1779; and in 1796 an iron arch of 200 feet span was erected at Sunderland, which is said to have been designed by the philosopher Thomas Paine for use in America. Waterloo Bridge was built by Rennie in 1809–17, in a style of magnificence hitherto unknown. The same engineer constructed Southwark Bridge of iron in 1813–19, and London Bridge of granite in 1825–31. The centre span of this last, 152 feet, is the largest elliptical arch in masonry ever attempted, and Rennie's bridge across the Dee at Chester, of 200 feet span, is the largest circular stone arch upon record. Suspension bridges were introduced from India in 1818, and the Union Bridge at Berwick, of 450 feet span, was built in 1819. Telford's Menai Bridge at Bangor is a suspension bridge of 580 feet span. Brunel's brick bridge, by which the Great Western Railway crosses the Thames at Maidenhead, has two elliptical arches of 130 feet. The most famous of the early girder bridges are Stephenson's Britannia Bridge over the Menai Straits and Brunel's bridge at Saltash. The Brooklyn suspension bridge, with a span of 1,600 feet, the Forth cantilever bridge, with two spans of 1,700 feet, and the Alexander III. Bridge in Paris, a single steel arch of 357 feet span, with a rise of only 21 feet, are the most famous of recent constructions.

The tunnels required have corresponded to the other works in importance. Numerous tunnels were constructed for canal purposes in the last century

mainly by Brindley ; and Trevithick, in 1809, carried a heading nearly the whole way under the Thames ; but those constructed in the latter part of the century have been immensely more important. Of the railway tunnels, Stephenson's Kilsby tunnel, on the North-Western, 2,400 yards ; Brunel's Box tunnel, on the Great Western, 3,200 yards ; the Mont Cenis tunnel, 12,300 yards ; the St. Gothard tunnel, 16,500 yards, with its corkscrew approaches ; and Hawkshaw's Severn tunnel of 7,940 yards, constructed under the most severe difficulties, are the most famous. The Tower Subway, constructed by Barlow in 1869, was intended for a demonstration of a mode of dealing with London traffic. It was designed to have a lift at each end, and an omnibus worked by power in the tunnel. It is of small value now, but its general idea and method of construction have been closely followed in later more important works. A reference to Brunel's Thames Tunnel of 1825–43, now carrying the East London Railway, and to the Blackwall Tunnel, a subaqueous tunnel of 28 feet diameter, constructed in the most unfavourable soil without loss of life or serious delay, may conclude this part of the subject. The middle of the century saw the canal system of England extended to 3,000 miles, a good deal of which has been since disused, through the action of the railways. The Caledonian Canal, proposed by Watt, was carried out by Jessop and Telford in the years following 1803, and the same engineers carried the Ellesmere Canal across the River Dee at Llangollen, on a viaduct of nineteen arches, of 40 feet span, 126 feet above the river. The Suez Canal, the scheme for which was reported to be impracticable by the English Commissioners of 1855, has been the most important single engineering work of the century, from its practical effects. The Panama Canal, the Manchester Ship Canal, the Amsterdam and North German Canals require notice

Ships propelled by steam were tried by Ramsay in 1793, and by Earl Stanhope in 1795. The first practical steamship was the *Charlotte Dundas*, constructed by Symington for Lord Dundas in 1801, and used for towing vessels on the Forth and Clyde Canal. The American, Fulton, copied it on the Seine, and afterwards in America, where the *Clermont*, fitted with an engine made by Boulton and Watt, was tried on the Hudson. Bell, of Glasgow, built the *Comet* in 1812, and Cook built the *Glasgow* in 1814, which was the first real success. Numerous vessels followed. The General Steam Navigation Company was established in 1825, trading with Cadiz, St. Petersburg, and English ports. In 1827 the *Enterprise* made the voyage from London to Calcutta. In 1838 the *Great Western*, built at Bristol, steamed to New York in thirteen days ten hours. The Cunard and the Royal Mail Companies were founded, and ocean steam service was an established fact. The melancholy history of Brunel's *Great Eastern* is well known. She had the fault of being ahead of her time. To present ideas she was not too big, for several of the Atlantic boats are of practically the same size, and two of the latest, the *Oceanic* and the *Philadelphia*, exceed it. When her hull was broken up the *Great Eastern* was a sound and well-designed ship. Fast steaming had been made possible by the use of high-pressure steam; and improved water-tube boilers and Parsons' steam turbine are likely to give still greater speed. The most sensational recent events have been the speed of forty-three miles an hour, attained by the torpedo-destroyer *Viper*, and the reduction of the Atlantic passage to a little over five days by a German boat.

If any one process had to be selected as having contributed to the engineering success of the century more than any other, it would undoubtedly be the improvement in the manufacture of iron. Before

1784 three kinds of iron were available. Cast iron from a blast furnace, malleable iron made direct from the ore by one of the primitive forges, and high steel produced in small quantities, at a high price, but of extraordinary quality ; though some of the stories told of Toledo, Damascus, and Indian blades are incredible. All the high steels were and are still produced by "cementation," and the process of melting the bars in crucibles to get cast steel was introduced by Huntsman, of Sheffield, in 1740. Henry Cort, of Gosport, patented the method of making malleable from cast iron by puddling in 1784, a process in use on a large scale without substantial alteration at the present day. Cort had taken out a patent in 1783 for rolling iron, and these two processes made rolled iron bars practically available for engineering work at the beginning of this century, which could hardly have been the case had engineers been dependent for their supplies on charcoal forges and hand-hammers. In 1827 Henry Neilson discovered the use of the hot blast for iron furnaces, which has effected an immense economy in the fuel required. In 1845 Heath attempted to make malleable iron by fusion on an open hearth, but failed through not having sufficient control of the heat. His process, however, was practically the same as that in which Siemens afterwards succeeded with the regenerative furnace. In 1855–6 came Bessemer's converter, making nearly pure iron direct from cast iron, and producing the material known as mild steel, which has revolutionised many branches of construction both by its admirable qualities and its cheapness. In 1857 Siemens invented the regenerative system, and in 1863 applied it to the open-hearth steel furnace. From such furnaces mild steel of excellent quality and great uniformity is obtained. In 1873 Siemens patented the precipitation process for producing iron and steel direct from

the ore. The Bessemer process removes nearly every impurity from iron except phosphorus, which is for constructional steel the most serious impurity of all, since it produces brittleness. The puddling process removes nearly all the phosphorus, but is much more expensive. Iron masters who had been using the Cleveland phosphoric ores found themselves being ruined. The old puddling process would not compete with Bessemer's in cost, or in the quality of the product, and Bessemer's process would not answer except with ores, such as hematite, free from phosphorus. The basic process, discovered by Snelus in 1872, and introduced into practice by Sidney Gilchrist Thomas some years later, removed the phosphorus from the iron in a Bessemer converter, and produced a slag valuable for manure, on account of the large amount of phosphoric acid contained. The Gilchrist Thomas process revolutionised the steel industry of the world, as the Bessemer process had created it.

The discovery by Volta of the electrical current in 1799 marks very definitely the beginning of modern electrical science. Electrolysis of metallic salts and the electric arc followed immediately. The electromagnetic field was discovered by Oerstedt in 1819, and electromagnetic induction by Faraday in 1831. Maxwell invented his electromagnetic theory in the sixties, and Hertz demonstrated it in 1888. In 1867 Siemens and Wheatstone independently invented the dynamo. In 1876 came Graham Bell's telephone, and in 1878 Hughes' microphone. The developments of these inventions are too numerous and too recent for even the slightest sketch, though Cook and Wheatstone's telegraph of 1839 between London and Slough, and the Atlantic cable of 1866 may be recalled as historical events. But for the rest, the growth of the applications of electricity has been so rapid, and each new development is so quickly surpassed by another that no general survey seems

possible. Since the production of the incandescent lamp in 1881 electric lighting has become an established industry, offering little prospect of development except in the scale of its operations. Telephony is in much the same position, except that there is room for improvement in the details of the mechanism and in the construction of long-distance lines. The utilisation of the powers of large waterfalls by means of turbines and dynamos, and the distribution of the energy for driving machinery and heating furnaces are the wonder of the present day. Of the many installations of this kind that at Niagara is the best known, but they are being erected in many countries on a large scale. Power is said to be produced in Italy by these means at a cost of 6d. per hour for a hundred horse-power. To the extent to which electrical power will be transmitted along wires for all sorts of purposes, especially for railroads and tram lines, no limit can be assigned. By his application of the Branly coherer to the detection of electromagnetic waves, Marconi has made his system of wireless telegraphy a pronounced practical success.

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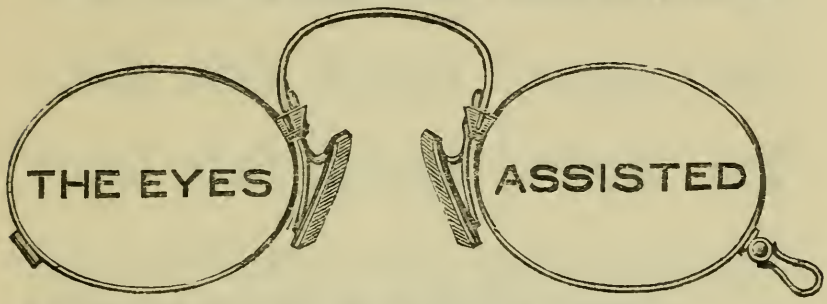

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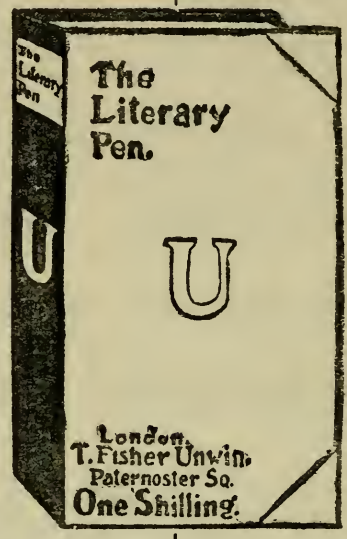

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